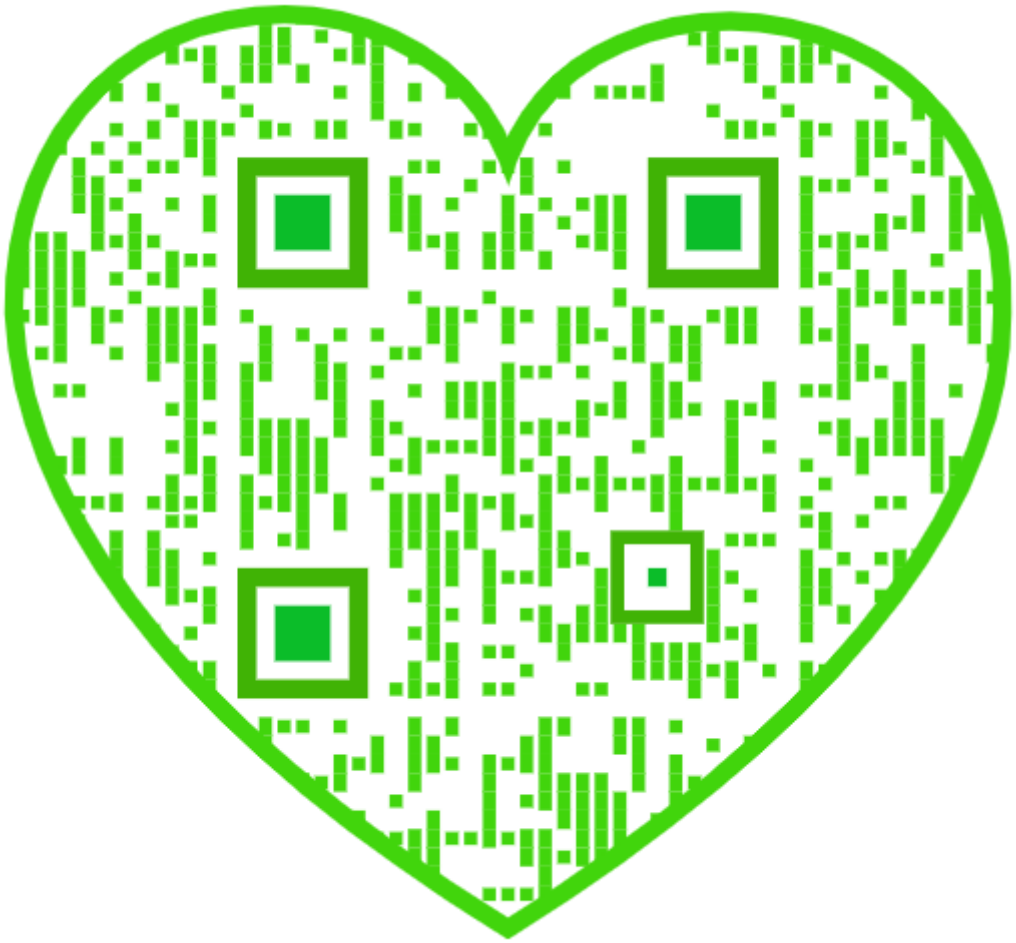

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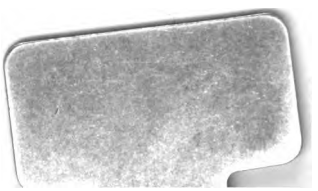

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A

MANUAL

FOR

NEW ZEALAND

BEE KEEPERS.

BY

WILLIAM CHARLES COTTON,

ST. JOHN'S COLLEGE.

WELLINGTON, NEW ZEALAND:

PRINTED BY R. STOKES, AT THE SPECTATOR OFFICE, MANNERS STREET.

1848.

A MANUAL, &c.

THE following Manual is intended for the use of all persons in this island who wish to keep bees, but do not like to do so, because they feel they know not where to apply for instruction. Their ignorance magnifies, as is always the case, their difficulties, and they shrink from what they would find a pleasant employment from fear of failure. I will do what I can to supply the want which they feel; but I would warn them that, in this as in all other matters, what a man *can* learn by reading is nothing to compare with what he *must* learn, if he is to succeed at all, by his own observation and experience. His own bees will be better teachers than any other bee master whatsoever; all that such a person can do for him, is to introduce him as a pupil in this school, and then leave him to make the best use of his own eyes. For the sake of clearness, I will fancy that I am actually speaking to one of these honest would-be bee masters, and will try to tell him all that is actually needful to enable him to make a beginning, so that bee masters of older standing must not be surprised at finding nothing here but the simplest and plainest practical hints.

Yet even they may perchance learn something new; for if they have kept bees all their lives in England, they will have many of their old notions to unlearn in this more equable climate. They will see many things which would be perfectly incredible if told of bees in England. But more of this in its proper place. I will without further preface proceed at once to divide my subject, for the sake of reference, under the following heads:—

I. Proper Situation for an Apiary.
II. Obtaining and Moving Bees.
III. Form of Hives.
IV. Swarming and Hiving.
V. Taking Honey.
VI. Uniting Hives.
VII. Feeding.
VIII. Preparing Honey and Wax for Use.
IX. Bees' Enemies.
X. Miscellaneous Remarks.

I. Proper Situation for an Apiary.—It must be sheltered from the prevailing winds, and yet not blocked up in the front, by high trees or buildings; open to the sun in the morning, and yet so constructed as to screen the hives from its direct rays at mid-day; this may be done by an overhanging roof, which will also keep the drippings of the rain from the hives. Every one may use his own taste in the form of his bee house. This is of no consequence, if the hives be only screened from the sun and sheltered from the wind; and yet I think a shed open in front, so that the air may circulate freely about the hives, and keep away damp, with room enough

for one or more persons to pass along at the back of the hives, and look into any which may have windows, or glasses on the top, is as good a form as can be. It is not indeed at all necessary to have any house at first. The single hive, with which a settler begins his bee keeping, may stand on a stool, in some sheltered nook of his garden, within sight of his door, if it be only covered by a straw hackle, such as are used for this purpose in England. And when not this single hive alone, but a goodly row of off-shoots is seen in his garden, when the owner of them finds bee keeping a pleasant and profitable employment, he may then think of putting up a permanent shed for his favourites, ***or rather their produce of the following year*** (for he must beware of moving his old stocks),* "and within sight of his door," because his bees must be in some place where the eye of the master can be constantly upon them, specially at swarming time, or else many an unheeded swarm will make off into the woods. I remember to have seen in Switzerland hives standing in a handy and picturesque situation, viz., on a shelf under the overhanging gable end of the houses, which are almost universally decorated with this beautiful living cornice. I fear it will be a long time before our English settlers get out of the way of running up the sightless square weatherboard boxes, with which our clearings are studded, where there is not a foot's breadth of shade or shelter under roof or gable, no room to place a row of hives, hardly room under the eaves for a swallow to build her nest, were there

* See in the Appendix a chapter from De Gelieu's Bee Preserver.

such a bird to gladden the cottages of this island. Remember, I do not speak up for a Swiss cottage merely by reason of its great outward beauty, but as an excellent shelter in a climate remarkable for the severity of its storms of wind and rain. A weather-boarded box is neither wind nor water proof, and nearly as hot as an oven in summer, whilst a Swiss farm house is warm in winter and cool in summer. This by the way.

I said above that your bee house must be sheltered from the prevailing winds. You may perhaps answer, "What is the use of trying to keep bees in such a place as this, if wind be hurtful to them, for sure we have enough and to spare?" Let your bee house itself be sheltered, and then, as to the rest, the bees will look out for themselves. You may observe them tacking about, as it were, in order to get to windward, and taking advantage of every bit of available cover, like clever sharpshooters, and as long as they are at the top of their speed they will come to no harm. But when they are preparing to pitch on the lighting board of the hive, and are poised as it were in the air, like a bird before it perches, then it is that a violent blast of wind cutting across the mouth of the hive throws them to the ground, and if it is wet and cold they get chilled and cannot rise again. This often happens when there is plenty of honey and bee bread to be collected. I have seen hundreds of bees strewn in the front of a hive, with their thighs heavily laden with their yellow freight. N.B. It is quite a fable to say, as bee writers have done one after another, that bees,

when overtaken by high winds, pick up little pebbles to steady them in their passage home. The loads of bee bread, which often prove fatal to them, must have been taken for this. So much for the situation proper for your bees in reference to your own house and garden. What I have to say about the best stations for extensive apiaries in reference to the country at large, will more properly come under the head of taking honey.

II. Obtaining and Moving Bees.—Having now pointed out a fit place for your bee house, I shall go on to tell you how to stock it. Get a swarm from a friend early in the season, that is in October or November, in order that your stock may be well established before the swarming season is over (the end of February), by which time you ought to have several hives in your bee house. For if you begin bee keeping later in the year, and your single stock meets with some accident in the winter, you may perchance get discouraged at having to begin again. I trust that in a very few years no one who wishes to keep bees, and whose house is in a proper situation, will have any difficulty in getting a swarm given to him. For in this climate bees are so wonderfully prolific that I have known as many as twenty-five hives come from one in the course of twelve months; not all from the parent stock, but standing to it in the relation of children, grandchildren, great grandchildren, great great grandchildren, and even great great great grandchildren, to the fourth and fifth generation. But as this very large increase can only take place in the warmest situations, I will

suppose the increase to be much less than this—say from five to ten fold every year; and he must be a stingy bee master indeed who will not freely give out of this his abundance. Yet I am sorry to have heard in New Zealand of persons selling bees at high prices, and of others complaining that they could not get them at all; that those who have bees would neither sell nor give, though the new apiary was to be in an outlying district where the bees could not possibly interfere with those already established. This is not as it should be. In many parts of England no man would think of doing such a thing as paying money for a hive. He would hold it unlucky, and say that bought bees never come to good; so he begs a swarm from a friend on these terms:—next year a swarm is returned with a pot of honey as interest, or a little pig given in exchange. This is a sort of half and half measure, springing I doubt not from a good feeling at bottom. But it is not enough to please me. I hope all who read this Manual will take the hint, and freely give away a certain portion of their increase, one in three, one in five, or one in ten, not as thinking it unlucky to sell them, but from a desire to do a good turn to their neighbours whenever it is in their power.

When you have obtained the promise of a swarm (I am now again speaking to my imaginary pupil), be sure you send your hive ready to put the swarm into (just as at a dispensary the physic is put into *your own bottles)*, for it is too great a tax upon your friendly bee master to ask him for bees and hive as well. When your hive is stocked I doubt not but

that you will soon hear the good news, if you are as eager in the matter as every young bee master ought to be. When I was a boy I have sat for hours day after day watching intently the mouth of a neighbour's hive from which I was to have the first swarm: indeed I spent in his garden all my spare time for a month together; for I remember that in that particular year May was very cold, and I would not take the owner's word, who knew more of the matter than I, that his bees were not near swarming: and oh! the delight when my long watch was rewarded by seeing a glorious swarm fill the air.

When your hive is stocked, tie it up securely in a cloth, that same evening, and carry it to the place where it is to stand. It must *on no account be moved again except to a considerable distance.* A new swarm may be so confined for a day or two, if you want to carry it more than an evening's journey, for bees swarm with their honey bags full, and their first employment is to make wax, which is in-door work. The cloth which is tied over the bottom of the hive must be of such an open texture as to admit air freely, and yet not so open as to let any bees out. The stuff which I use for the purpose is that which is, I believe, called dairy canvass, and is made for straining milk. But if you want to take your bees to a great distance, down the coast for instance, and the voyage may last a week or a fortnight, it is best to let the hive stand for ten days or so in your friend's apiary, then tie it up in the cloth as before, and hang it somewhere in the ship out of the light, or at all events, screened from the sun, where it can swing

freely without fear of knocking against the side of the vessel, and then you may carry your treasure to the most distant part of these islands in safety. A common straw hive is certainly the most handy for carrying bees any great distances, for the cloth is more easily tied about it. You must look at it every now and then to see whether the bees are forcing their way out. They will try to do so, and when the cloth is taken off you will find that portion of its surface which was exposed to the bees carded into a sort of lint, by the action of their jaws. You will see their feelers pushed through the canvass in great numbers, searching for a passage into the open air. If you find that they are making a hole, through which they will soon force a passage out, nothing is easier than to tie another fold of cloth over the bottom of the hive. Should the swarm be in a wooden box, the best way of securing it is to lash it firmly to a bottom board, with no door at all cut in it, and then push in little wedges between the box and the board, so as to raise the hive about an eighth of an inch all round. This will both tighten the lashings, and also give the bees a sufficient supply of fresh air; and it is much better to give it them in this way than at one single doorway, through a piece of perforated zinc or tin. For, in this latter case, the bees seeing light at only one point will often crowd so much to it, as to prevent the free entrance of the air. Such few bees as die on the passage will also be carried to the entrance, which they will help to block up, so that at last the whole swarm may be stifled. But by wedging up

the box all round, the bees will have breathing places everywhere, and you will see them, if you peep in, not struggling to get air at one place only, but running about in every direction on the floor board, like children playing at puss in the corner.

The reason why I advise you to take with you a hive of about ten days old, and from that to three weeks, is this, that a swarm of that age will have built a certain quantity of comb, and laid up honey enough to serve them for the voyage, and yet the combs will not be so heavy with honey or brood, as to put them in danger of breaking down; or even should you be so unfortunate as to get one, or even all the combs, broken down by a sudden blow, the bees will not be smothered in their own honey, as I have known to be the case with a heavy hive. They will get themselves clear in a very short time from the fallen combs, from which they will draw enough food to last their voyage, whilst they themselves will hang in clusters from the top. When you reach your new home with this large batch of fellow immigrants, do not set them at liberty till the even. If you are in a hurry, and open the hive directly, the bees will rush out in great confusion; many of them, if they have been long shut up, will fall on to the ground, and if it be wet will not rise again. Or a still worse result may follow. If the combs have all been broken down during the voyage, and the bees much annoyed at it, the whole swarm, Queen and all, will rise at once, and take to the woods as irregular squatters, instead of remaining to colonize your garden in a systematic way. Wait, I say, till the

even; and just after sun-down, if you hear that the bees are all quiet, undo the lashing, and get some body to lift the hive up a little from its board; then, if any combs are broken down, remove them quietly, and the following morning you will have the pleasure of seeing your fellow colonists going as regularly to work as though they had been in their new station for years. I only hope you may be as industrious, and then like them you will most probably succeed.

In the winter a heavier hive may be safely moved to a new station, for by that time the combs will be more firmly fixed, not only to the top of the hive, but also to the sides; and as there will be no longer any brood in the combs, they will be relieved from this great weight. But as most people choose the summer for their own movements, I suppose that bees will generally have to make the journey at the same time. And this journey they always should make in company with any settler going to a distant station; for the benefit they will do to him is very great: but more of this when I come to speak of bee produce.

Some people put cross sticks in all their hives, thinking them needful to support the combs. If very securely fixed, they may be useful in hives which are to be carried to a distance, but in no other cases ought they to be used, as I shall presently shew; they are the greatest nuisances when you come to take the honey, and are useless at all other times. A comb will not break down as long as the hive is not moved, and is protected from the direct

rays of the sun: trust the bees to do their own work securely; there are no bunglers amongst them.

One other hint I will now give touching the removal of your bees: when you come to turn a hive up, to lash it to its board, to look inside, or to cut out some honey comb, first ascertain how the combs run in the hive; I mean from front to back, or from side to side. The combs, you know, are all parallel to each other, like a number of books hung up to dry on strings, with a quarter of an inch between them. When you know which way they run, be very careful to turn up the hives so as to keep the combs *always in their own planes*. This may be rather too difficult for some of my readers, but as it is of great importance, I will try to make it clear. Let one of the books, which I have taken to represent the combs, be supposed to be glued by its back under a flat piece of board, instead of hanging astride on the string. The glue is just strong enough to hold it, as it hangs with its edges downwards. I want to look at these edges. There are two ways of turning the book. In one way the book would break off by its own weight, in the other the glue would hold. In the former, the leaves of the book will open as you turn it—in the latter, the back or edges will be always towards you. Try this, by turning a book in your hands, without of course glueing its back, and you will then understand what I mean by turning up the hives, so as to keep the *combs in their own planes*. This is of the greatest importance; and as I bought my own experience dearly, by making a miserable smash of a fine parcel of combs in a hive

which I turned up the wrong way, I am willing that you should have it at a cheaper rate, without making your bees pay the penalty of your ignorance.

III. HIVES: THEIR FORM AND MATERIAL.—As I told you to send your own hive to the friend who has promised you a swarm, I must now speak of the best shape and material. In this respect the bees are in no wise particular. I have known them do well in all sorts of places, from a hollow tree to an old watering pot, with the spout stopped up. A man's hat is no bad thing to hive a strange swarm in, if he sees one settled on a bush. He may carry his prize safely home in this strange hive, and when the even comes shake them out into a more befitting home. One who has his wits about him, and his eyes too, and who is unable to beg or borrow a swarm, will, as soon as our woods are stocked with bees, be often able to make a beginning in this way. I have known still stranger hives (if I may call them so) even than a hat, made use of at a pinch. A maori having seen a stray swarm settled on a branch, and having no hat to his head, managed to hive them in a garment he did possess, his only one in addition to his blanket. He took off his shirt, and wrapping it carefully round the bees, cut the branch off, carried it home, and put them into a box. I have since heard of another maori at Coromandel Harbour, who used his trousers for the same purpose, having first tied up the legs with a bit of korari. But you may say, what is the use of all this? I tell it you to prove that bees are not particular as to the hive they are put into, that they will build combs and make honey.

anywhere. The advantage, therefore, which one hive has over another is not so much in its material, straw or wood, as in the greater or less ease with which your honey may be taken from it. The old English way of "putting down" so many stocks with the brimstone match at the end of the season has, indeed, the one recommendation of simplicity, just as the robber's pistol and dagger are simple ways of getting money; but a rent willingly paid by a prosperous tenantry is a better way, though it be more complicated. I can show that the "putting down" plan is both wasteful and needless: I hope it will never become common in these islands; for the roughest bee master cannot "put down" his hives in autumn, without feeling that he is doing a cruel deed, which he would gladly avoid if he knew how. Even the common straw hives may be so managed as to yield a large return without your having recourse to the sulphur match. But I am now to teach you how to make your hives, not how to take the honey from them. There is no prettier object in a cottage garden than a well made straw hive, daintily capped by its neatly plaited hackle: and it is so easy for a man who has the thorough use of his fingers to make these hives, and the materials are so ready for his use, that although the wooden boxes which I shall presently describe have many advantages, they will never drive the old straw hive out of the field. A man must be something of a carpenter to make a bee box; he need only be a handy fellow to make a straw hive. Carpenters' tools are wanted for the former, whilst the only things he

needs for the latter are a leathern pipe of three inches long and an inch and a quarter in diameter, for working the straw through, and a large curved awl of hard wood or bone, for piercing the bands of straw as they are sewn. As Cobbett well said in his Cottage Economy, "he must be a stupid countryman indeed who cannot make a beehive, and a lazy one indeed who will not if he can." No man perhaps ever learnt to make a straw hive by reading how it is made, but by seeing another man working at one; so I will not take up a page or more in a long description of the stitch, if I may so call it, but beg any one who keeps bees to learn as soon as possible, and not to rest content with his work till he can sew a hive so tight that he can stand on it without bending it in at all; so close, that not a ray of light can be seen through it; and so neatly, that not a stitch can be found out of its place. Your first attempt may be a rude one, but be not daunted; go on till you can turn out a masterpiece. When you have done this, you need not keep yourself to hives alone; there are many things you may make in this straw work: corn baskets for the thrashing floor; market baskets for your wife; a cradle for your child; and above all, a beehive armchair for your old father or mother to sit by your chimney corner. It is a nice thing to see a settler's home with plenty of good furniture in it; but I can fancy none so ornamental as the wife with her basket, the child in its cradle, and the old father in his chair, all your own handywork. I lately shewed the stitch, and the mode of using the leathern pipe, to some moaries at Otaki, and I

had not to spend long about it; in an hour I was fairly beaten by my pupils, and before evening several of them had finished their first hive. At Waikanae I did the same, and the old man who has the care of the bees in that place was so ready at the work, that his second trial produced as strong and handsome a beehive as I have ever seen in any country. I doubt not but that before long maori made hives will be sold at eighteen pence or two shillings each in every town in New Zealand; if at the beginning of the swarming season any storekeeper will be kind enough to take them in and let one hang at his door. The straw which is used should not be broken with a flail, but pulled and prepared as for thatching, though with still greater care. It must be damped to make it work freely, as must the split kareau (supplejack) with which you may sew it. In England I have seen withy, hop vines, or bramble, made use of for this purpose; we shall soon have plenty of the two first in this country, but the kareau makes a capital substitute. Till you have thoroughly mastered the stitch, you may use split flax to employ your "prentice hand," but do not afterwards. It will dry up, and so make your work loose. You should have several pipes of different sizes by you, because baskets, small caps for putting on the tops of your hives, and other fine work, should be made with a pipe of smaller gauge than a full sized hive.

A clever straw worker will soon learn to make his hives not only in the usual shape, but in others, from which the honey can be taken with as much ease as from the best description of wooden boxes.

I will now try to describe what I believe to be one of the simplest and best forms for wooden bee boxes, and then show how the straw hive can be modified so as to answer the same purpose. I do not know whether I shall be able to make my description clear without the aid of a woodcut, but at all events it may serve to show what part of the hive must be made exactly in one way, and in no other, and what parts are unimportant, and may be modified according to the fancy of the owner. At one time I was an advocate for the system of side boxes, and the application of ventilation to them; but I have had reason to think that boxes on the storyfying system are better adapted to this country, that the honey may be taken from them more easily than from almost any form of hive, and that they are both the cheapest and the best. Do not, however, go away with the idea that there is any magic in the form of box which I recommend, or that bees will make more honey in them, than in a hive of the rudest form—an old candle box or tea chest I have seen full of honey,—all I wish to do is to point out the form of box from which the honey may be obtained with the greatest ease. The box should be made of 1¼ inch stuff, which will plane down to inch and a quarter. It should be fourteen inches over all, which will leave 11¼ inches in the clear. The top is a moveable board prevented from slipping sideways by a projecting fillet which fits over the side of the box loosely, like the lid of a hat box. If the bees were hived in this box, as it is now, they would fasten their combs to the lid and to the sides, and there

would be no means of getting them out, except those in use for a common hive. But ten bars made of quarter of an inch stuff, and exactly one inch wide, are to be countersunk in the sides of the box, so that the bars may be flush, and the top fit down close upon them. These bars are to be fitted with exactly a quarter of an inch between them, and one eighth of an inch between the outside bars and the sides. The width of the bars, and their arrangement, is a matter of the greatest consequence, and that which is most frequently overlooked. A common carpenter, when he has an order for one of these hives, and has a pattern to make it by, will often say to himself, "there are these bars on the top. I will make them an inch and a half broad, or two inches, and put them half an inch apart; it will save me trouble, and I dare say do quite as well." He will then take the box home, and if the box was made for a novice in the craft, the bees will be put into it, and all will seem to go on well, till the time comes to take some honey, and then the error will be plain enough, as I will show when I come to speak of taking honey. The box should be about nine inches deep; with other boxes having similar bars across the top, but of a less depth, say four inches and a half or five inches, to fit on the top. One lid of course will do for a set. Windows you may put into the sides of these boxes of any size, and covered with shutters of any pattern, if you wish to see the bees at work;—but when you have a great many boxes made, you will like to get them as cheap as possible, and the windows may be omitted altogether;

for an experienced bee master will tell by the weight of his hives when they have honey to spare for him. The bottom board should project at least an inch round the hive, and pieces clamped across the ends to prevent it twisting. The entrance for the bees should be countersunk in the bottom board, four inches wide, and a quarter of an inch deep, running up to nothing; a semicircular lighting board five inches wide should be under this doorway. A drawing or a model would be much more useful than this description, and I hope to send down from the apiary at St. John's College patterns of the different forms of hives which I should recommend my pupils in this place to adopt. At present they had better be content with hives of the above form. I have had some made for the maori bee keepers at Otaki and Waikanae by a carpenter of this place, who gave me satisfaction in the work which he did under my directions; and he has promised me to be equally careful in making any others which may be ordered of him. Give your wooden hives several coats of paint before the bees are put into them, and they will then last many years, if they are substantially made. I have still some boxes in use which I had thirteen years ago, and they are likely with care to last twice that time more.

Now, this form of box can be imitated in the straw hives. The top should be made quite flat, and moveable, with a projecting rim of straw work. The inch bars may be kept in their places by small wooden pins driven through their ends, into the top of the straw hive on which they rest,—as of course

they cannot be countersunk into the straw work;—a rim of straw must be worked round the top edge of the hive to cover the ends of the bars, and the lid must fit over all. The hive itself when the top is off, and the bars are out, is nothing more than a hollow cylinder of straw nine inches deep.

Another form of the straw hive is the barrel or Sicilian hive, which consists of three or more of these hollow cylinders of straw, fitting one into the other, and supported horizontally on a frame, like a barrel on tressels. This will be a very useful sort of hive, as one or more of these rings may be taken at a time, as I shall hereafter show. I will not attempt to describe the form of it now; but will send a pattern of each of these hives to my Waikanae straw workers, who I am sure will make for their own use as well as for sale.

I shall reserve the description of several other hives, the *ruche a l'air libre*, or open hive of the French —the observatory, or single comb hive, by which all the internal economy of the bees may be seen—until the appendix to these letters; as a young bee master must be content to establish his apiary in the most simple way before he goes on to anything more difficult. He must walk before he tries to run; he must become familiar with his bees, learn to handle them properly, and know something about them from his own observation, before he uses more complicated hives, or tries experiments of his own; or both he and his bees will most likely suffer for it; he by getting well stung for his pains, and they by losing their lives in the act of stinging.

IV. Swarming and Hiving Bees.—

A swarm of bees in May
Is worth a load of hay,
A swarm of bees in June
Is worth a silver spoon,
A swarm of bees in July
Is not worth a fly:

so runs the old English saying: here a September swarm does not differ so very much in value from a February one; for the swarming season ranges between these two months. I have known a swarm of the latter month support itself very well through the winter, and in the following spring become a most productive hive. Still, as I said before, a young bee master had better get a stock early in the season, and then he will have a whole row before it is over.

Swarming is an act of colonization on the part of the bees. They fulfil thereby that part of the instinct implanted in them by their Maker, which leads them to spread themselves far and wide over the surface of the earth; so that if a single swarm of bees had been brought into these islands, and left to themselves in a protected situation, in a very few years every good locality would be inhabited by as many bees as the flowers of that district can support. What we do in hiving our fresh swarms, and placing them near the parent stock, is necessary indeed to enable us to get a good supply of honey from our apiaries, but is still an act in opposition to the natural law which the bees obey. There must therefore be a limit to this centralization, as I shall show when I come to speak of bee produce. What I have now to do is to speak more particularly about the act of swarming itself.

In September or October, as the season is early or late, the bee master must begin to look out for swarms, if his stocks are in good condition. There is no sign, as far as I know, by which he can tell to a day or so when the *first* swarm will rise; the after swarms give clearer signals. For this reason I said, that the first stock with which a bee master begins his apiary should be within sight of his door, or else he may chance to lose some of his early swarms; and this in the first year of its establishment will be no trifling loss to him. In after years, when he has from forty to fifty parent stocks, he may well afford a swarm or two for the department of the woods and forests, having, I suppose, by that time fully supplied all his private friends. Look at your hive in the quiet even when the work of the day is over: if the bees stand about the doorway, fanning with their wings, and pleased as it were with the prosperity of their large family,—if a pleasant and wholesome smell comes steaming from the mouth of the hive—and I know no smell so pleasant as that of a healthy beehive, unless it be a fine dairy of cows at milking time,—if you have seen a number of young bees on the lighting board for the last few days, (and you can tell them by their being at first covered with a greyish down, and quite damp, as they issue from the cell),—if, in fact, all be going on well with your hive in the month of October, look out for a swarm. Your children, if you are so fortunate as to have a fine swarm of them, will soon learn to stand sentry over the hives, and will take a pleasure in calling by their own names the swarms which

they have seen rise. And now for the act of swarming itself. At some period of the day from ten o'clock till two, an unusual bustle is seen at the mouth of the hive:—single bees rush out in a hurried manner, and after running about for a minute or two on the lighting board, as though they were looking for something, and perhaps crawling up the front of the hive, enter in again. All work seems suspended for a time, at least no fresh labourers leave the hive to collect honey, although such as have completed their loads keep returning home, pushing their way through the crowd of loiterers who are blocking up the door. Now the confusion increases; keep your eyes fixed on the hive, and you will soon see a wonderful sight. A stream of live creatures begins to pour out, increasing in volume, until at last it is as wide as the doorway through which it passes: no longer do the bees run about in an irregular way, but each presses forward, each in his own place, walking steadily along, and making a peculiar sound with their wings which is heard at no other time. As the bees reach the end of the lighting board they take wing, and fly backwards and forwards, wheeling about as in a joyous dance, and waiting for their mates who are to follow. The stream has now flowed on for two or three minutes, and is still as dense as can be. Keep your eyes steadily fixed on the board, though it may chance to make you dizzy, just as when you look fixedly on a column of falling water, and you may perchance see the queen. There she is: besides other marks which are not so easily noticed, you may know her by this—her body is much longer than that

of the common working bees, and is of a redder tinge. She turns back as though unwilling to leave the hive where she has reigned queen; but she is unable to stem the torrent of her subjects, which is still rushing out. She is forced by them along the lighting board, and at last takes wing. You may still follow her in her course, for she is heavier in her flight than her subjects; at last she is lost in the cloud of bees which fill the air; and a glorious sight it is. Now give them their swarming music; the proper instruments are a warming pan and the house key; but in default of the former, a tin pail or a kettle will do; rattle them well together to make the swarm settle. Whether this rough music has any such effect, I cannot pretend to say; but it is a good old custom, and can do no harm: I will presently tell you what good it can do. The cloud of bees now darkens in one particular direction. They will pitch on that apple tree: no, farther off still: they are gathering upon a gooseberry bush. The nucleus is formed; and, in a few moments, by a sort of animal chrystallization, all the bees are deposited upon this point, and hang down a cluster like a bunch of grapes in shape. Thus ends the first act of swarming, which is in fact the gathering together of the body of emigrants at a common depôt, where they quietly remain, till some scouts whom they send out, to look out for a place for them, return back to the main body, and tell them that all is ready. Then they rise, and not before; they no longer wheel round and round, as though searching for a lighting place; and the bee master who has not put his

swarm into hive before they start on this second course, has little chance of ever calling them his own. He may follow them indeed, as I have done twice in my life for more than a mile, but 'twill generally be as fruitless as a wild goose chase; for the bees rise higher and higher, and the last he sees of them, as they are sailing away over the top of the highest trees, is a thing like a thin but well defined cloud as it is borne rapidly along by the breeze. But the object of the bee master is to give the bees a hive before the scouts return. Your hives should be at hand, that there may be no hurry or delay when the time comes for using them. If the swarm has settled on a spot exposed to the direct rays of the sun, it is as well to screen them by throwing a cloth over the bough, or by any other shade which the place will allow you to use. The mode of hiving bees will depend much upon the place on which they have settled. It is well to have a number of low shrubs planted near your bee house, as, if the swarm light on a high tree, you will have much additional trouble in securing it. But there is no place so awkward that a bee master need despair of hiving his bees which may have settled there, if he but set to work quietly and perseveringly. Do not use thick gloves, or any of those other articles of bee dress which you will sometimes see recommended. For any thing which hinders you from moving about with ease—anything which prevents you handling your bees with a gentle touch—anything, in fact, which makes you awkward, or shows that you are timid amongst them, will be less likely

to protect you from stings than to draw them down upon you. The bees, too, are particularly gentle when in the act of swarming, however irascible the parent hive may have been up to that time.

If the swarm has alighted on a small bough, nothing is easier than to hive them. Spread a cloth on the ground, and on it place the bottom board of the hive. An assistant must then hold the stem, on which the bees are settled, on each side of the cluster, so that it may not fall to the ground, when you with a sharp knife cut it off. Place the twig, with the bees hanging to it, gently on the bottom board, and then set your hive over it, propping it up on one side, that the bees which are still on the wing may find their way in. Lap the cloth round over the hive on all sides but this one, and otherwise shade it well from the sun, and your work is done 'till the even, when you must set the hive where it is to stand. You should, however, keep an eye upon them, or else when you go to move your hive you may find it empty, the bees having flown. But in such a case it often happens that they have returned back to the parent stock.

A stock which has thrown off a strong swarm has for some days after an exhausted look, until a number of young bees are hatched to fill up the vacant space in the hive; so you may generally make a pretty good guess whether the swarm which you safely hived, but was gone by the evening, has returned to the parent stock, or fled to the woods. If the parent hive is as crowded as before, if there is still a great fanning at the door, you may console

yourself under your disappointment (and it is no slight one to find an empty hive when you expected to find a full one) by thinking that the swarm has returned home again, finding that the queen has not made her appearance at the appointed place. And in this case you must look out for a swarm the next fine day. I once had a swarm go back, which I knew was led by a queen; for I saw her pass in procession along the lighting board. I was surprized at this, when my puzzle was cleared up by my little bee warden (the boy who watches for my swarms, and is so fond of his work that he is more than half a bee himself) finding the queen hung up in a cobweb between some palings over which the bees had passed in their way to the place where they alighted. This also proves that the bees do not follow the queen actually (for were it so, the whole swarm should have been in and about the cobweb), but flies along with them to some spot fixed on by the advanced guard of the swarm. I have since confirmed this idea by some other experiments, which I shall not now describe, but will probably give the result of them at some future opportunity. My little bee warden has learned from me to catch the queen, as she is leading out the new swarm: he can very often lay hold of her after she has settled in the midst of the cluster (you may put your hand into the midst of it, if you do it softly and fearlessly), and has a very sharp eye for finding her on the ground; for she often falls at the mouth of the hive at swarming time, surrounded by a cluster of bees as a body guard.

The method of hiving bees which I have given above, can only be followed when the swarm settles on a bough, which you can easily cut through with a sharp knife. If they settle on a branch which is too long to cut off, or one which you do not like to destroy—an apple tree, for example—you must vary your mode of action. Have the hive held close under the swarm, so that the long beard of bees may hang down into the hive itself, till it touches the bottom (or rather the top), then give the bough a sudden shake, and the bees will fall down into the hive; brush off into it with a feather any clusters which may still be clinging to the bough; then, still holding the hive in the same position, put the bottom board on it, as a sort of cover to the bees. By the help of another person turn the hive into its proper position, and set it on the ground, near the foot of the tree on which they settled. After four or five minutes' confinement, raise up one side of the hive by means of a stick, so as to give the bees who are still flying about access to their fellows, and if the queen is safely hived, they will all speedily join her. But if you see that the stream of bees is setting out of the hive rather than into it, you may suspect that all is not right; search any cluster which you may see lying on the ground near the hive, any bunch which may still be on the tree, and if you see the queen, seize her gently, and put her into the hive.

A novice should not attempt to hive his bees for himself, if they settle in more difficult places, but send for some more experienced master in the craft, if one is within reasonable distance; having first

carefully shaded the bees, or else they may perhaps be off before his arrival. If there is no help at hand, he must e'en do the best he can. If they cluster on a post, or stem of a large tree, you must use a bunch of feathers, or still better, your hand, and so *coax* as many of the clusters as possible into the hive. Look out sharp for the queen; for if you secure her, and get her into the hive, all is right, and the rest will follow.

I believe that the old queen always leads the first swarm, for this reason: That as soon as any combs are built in the new box, the queen lays a vast number of eggs in them, as though she were only continuing a process begun in the old hive. I have taken a comb with eggs in it out of a hive the second day after swarming. I hardly think a young queen, leading a colony a day or two after she issues from the cell, could produce eggs so soon. This matter, however, I hope to clear up some day, by marking the queen of a hive in the early spring, and tracing her through all her swarmings during the course of the summer. I said that second swarms give more certain signals of swarming. If you put your ear close to the top of the hive in the still of the even, some days after the first swarm has risen, you will hear one of these signals, a cry very unlike any other ever heard from a beehive:—

Peep, pe peep, pe pe peep, cries one queen;—Peep, pe peep, pe pe peep, answers another in a higher key. One cry is that of the reigning queen, the other is that of a full grown queen bee, still confined in her cell, where she is kept by the worker

bees a close prisoner; for if she had her will, and was allowed to come forth before the moment of swarming, either she, or the reigning queen, would fall in single combat. When this noise is heard in a strong stock, look out for some more swarms. A bee master who has only been used to the English rate of increase, will be perfectly surprised, and as it were overwhelmed, with the multitude of swarms which will issue from his hives in one season, after his apiary has been established a year or two. So he does not get his hives ready in time, and he is often in great straits in swarming time. I will give one amusing instance:—A carpenter who has been many years in New Zealand, and is perhaps in consequence very procrastinating in his habits, was surprised by his first swarm rising when he did not expect it. He had no hive at all ready. Fortunately he had heard that the queen may be captured, and that when she is so, the swarm will not go away: so he poked about with his finger among the cluster till he found the queen; caught her, and put her in a tumbler to keep her safe. He then went to his house, thinking it time to set about making a bee box. It was a very hot day: so he left his door open. He had not been long at work when he saw the whole swarm follow him into his house where his bench stood, upon one end of which they clustered, while he was hard at work with hammer, plane, and saw, at the other. It seemed as though they had come in to see what he was about, while he was so long in bringing them a hive; and they found, as many customers had done before, that his

work was not begun, when it ought to have been finished. However, he tried to make up for lost time, and hoped they would not be in a hurry to go. Just half an hour, and he would be ready for them. He never plied his hammer so fast before. He had not even time to whistle a tune: so, whilst he worked the bees sang. They waited quietly, expecting their future home; were safely housed in it as soon as finished, and were doing well when I last saw them, as I trust he may be doing;—the first carpenter who ever built a house with so many homeless tenants watching its completion. Further increase will no longer be an object with him. What he will then desire is to get as much honey as possible from his existing stock. How this is to be done, I purpose to tell you when I speak of bee produce. I forgot to mention above that there is one state of the weather which often induces a swarm to rise later in the afternoon than two o'clock. When it has been raining in the morning, and for several days before, and then the sun bursts out, and a hot sultry evening succeeds; on such an even as this, a swarm which has been for some days baulked by the weather will often rise as late as four o'clock: have your eyes well open then, as indeed you always should amongst your bees, either to do something for them, or to learn something from them.

V. Taking Honey.—"The proof of the pudding is in the eating," says the old proverb, and most people prize their bees chiefly for "*the sweet food they make.*" I fear there are not many in this land who would take any pains with them, but for the

return which they expect. But there are these odds: —a plum pudding is made to be eaten, and has nothing particularly beautiful about it except its taste and its smell; whilst I, for one, should still love my bees even if I never got an ounce of honey from them. I should still study their wonderful instinct and habits: I should still think their buzzing the sweetest music, and love to bask at the door of their hives whenever pain of body or grief of mind makes their soft hum a soothing charm.

Besides, there is another good which bees do. They glory indeed in making honey, as Virgil says; but while they rob the flowers, they give full payment for what they take. They fertilize the yet half formed seeds, and help on the multiplication of those flowers from which they get their greatest supply.

To give an instance: Every one who keeps bees near clover paddocks, knows how rapidly his hives increase in weight when the white clover is in flower; indeed the bees gather more honey, and of a better quality, from this plant, than any other I know.

But what do they in return? Before bees were brought into this land, the white clover did not seed at all, or very scantily. Every bushel sown was brought from England at a heavy cost, and at great risk of being useless when it arrived.

But now, as much can be gathered in the country as is wanted; and this being fresh, is certain to grow: so that every one who has some paddocks well and carefully laid down, free from weeds and other plants, may get sufficient seed for his own use, and have a surplus to dispose of to his neighbours.

Every one, too, who has an orchard, will find his advantage in having a hive of bees near. The difference in the yield of a tree before and after it gets this help is very remarkable; so that it seems to me that flowers are furnished with nectaries from which honey is secreted, not so much that it may be gathered for the use of man, as that the bees, when busy rifling the hidden sweets, may aid in fertilizing the seeds of that flower from which they increase their store.

I have said so much before I give you my lesson in honey taking, that you may look upon your bees, not as a bear might, with an eye to the honey only, but with a mind able to admire their wonderful economy, as well as thankful for the benefit you derive from them.

Now, Mr. Bruin has a terrible taste for honey; and is the most merciless bee destroyer I know: defended by his thick and shaggy coat, he cares nothing for their stings: he has only one or two vulnerable parts, his nose and his eyes. When they attack him there, he coolly brushes them off, and continues his work of destruction. What cares he for a sting or two, whilst busy in satisfying his glutton appetite. As soon as he has laid bare the combs (and it is on bees that have lodged in a hollow tree that he usually makes his attacks) he gobbles them up, honey combs, brood combs, grubs, bees, and all; never pausing in his feast till he has utterly destroyed the work of thousands of creatures as clever as himself, and the lives of the workers too.

Now, I don't blame the bear, not I; he knows no better; he only follows his nature. But I do blame those men who might know better, and treat their bees in a bearish fashion.

There is no form of hive from which it is impossible to take honey without killing the bees. I said in a former letter bees will make honey anywhere, even in an old watering pot. The form and construction of the hives is of importance, because purer honey, and in greater quantities, may be taken from those of a good construction than from those that are faulty.

But I will begin with those of the most common kind, and after speaking of the method to be followed with them, I will go on to give directions for those which I would recommend you to use. In England, the straw hive is the common sort, and in almost universal use; but here there is a more common sort still. But few people in this country know how to make straw hives. I hope they will soon learn: at all events the natives will supply as many as they choose to buy, or teach the unhandy pakeha how to do the stitch.

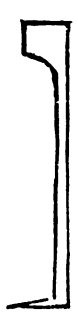
The still commoner sort that I have mentioned is an old candle box. Bee keepers here do not expect their bees to swarm so fast as they are found to do. They do not prepare a sufficient stock of hives during the winter; so that when the swarming season comes, they are taken quite by surprise, and rather than lose their bees, put them into the first box that comes to hand.

Bees are wax chandlers in a very large way of

business, and it is but scurvy treatment to give them no better lodging in which to carry on their trade than a box which has been lately filled with common tallows; but yet the honey will have no taint. A box like this will often contain between fifty and sixty pounds, which the owner might take for his own use, if he did but know how.

I have often heard this complaint, that people get plenty of swarms from their bees, but no honey: and when I went to look at their hives, I found plenty waiting to be taken.

To do the thing well, some little preparation must be made. A surgeon, when about to perform an operation, gets all his instruments ready, lays them out carefully, that he may know where to put his hand on each, and not have them to seek at the moment when he wants them to use; he also has his assistants, in whose steadiness he can trust, and in their knowledge too, as far as it goes. A surgeon's tools cost a good round sum; but the only instruments wanted by the honey taker, are, a knife, made to the following pattern—it is a rod of iron about two feet long, with a square blade at one end, sharp at the bottom and side, and a lancet shaped blade at the other, an inch and a half long, and a quarter of an inch or less over: a bunch of feathers: a basin of water to keep your hands free from honey: and a roll of linen rags, in order that you may be able to blow some smoke, as wanted, into the hive.



In Germany, where I first saw the method of taking honey in practice, almost every one, from the highest to the lowest, has a tobacco pipe hanging at his button hole. And this their pet instrument is universally used as the bee smoker. It does very well; but as I hope many a New Zealand lady will keep bees, and learn to take honey too, she may be glad to hear that a smoker can be made quite as efficient, and more to her taste, than the shocking pipe.

The most complete form is this:—Have a little tin box made two inches each way, put together with hard solder, so that it may not give with the heat which it will have to bear. A pipe should be soldered into the bottom of the box, and fit tightly into a pair of bellows. Out of the lid, another pipe should come to carry the smoke into the hive. The best kind of bellows are the patent circular bellows; for they keep up a continuous stream of air, and the bottom of the box itself may be fitted into their mouth. This is nearly the same thing as gardeners use for fumigating their choice plants; and as gardening and bee keeping are twin sisters, many a pair of fumigating bellows may be made to do double duty. But any kind of bellows will do, if the smoking box be carefully fitted into the nozzle.

The linen rags must be quite dry. I find it best to roll them up loosely in the shape of a sausage, and then cut them into lengths of an inch and a half, so that they may go easily into the box. Get the slice of rag well alight with a smouldering fire (not flaming), and then put it into the box, with the

lighted end towards the bellows. It is rolled loosely together, that the air may pass freely through it. When the rags are alight, give the bellows to one of your assistants, whose business it should be to keep them so, by giving every now and then a little puff, so as to be able to put the smoker into your hand whenever you want it, ready for instant use. Another of your assistants should in like manner be appointed knight of the feathers, and a third have charge of the comb knife, so that either may be put into your hand directly you call for it.

If you cannot command so many pair of willing hands, have a spare table by you, on which to lay down your different tools, that you may know where to put your hand on them as wanted. No one but your assistants should come near you whilst you are operating. As many of the uninitiated as please should be welcome to witness any operation of the experienced bee master; but they should keep at a respectful distance.

I do not advise you to put on any bee dress, such as you will find recommended in many old bee books. Masks, veils, thick worsted shawls, stockings and gloves of the same material, are all spoken of; so that one of these old bee masters must have looked like Mr. Bruin when full dressed. This would be all very well, if you were to begin your operations in his violent way. But I shall show you how to take away from your bees all desire to sting; and you, I trust, have no intention of hurting them, which is the only thing which would rekindle their angry feelings. Least of all should you put on

gloves with the idea of protecting your fingers from the sting. A man might as well try to play the fiddle with his hands muffled up; for the success of all bee operations mainly depends upon delicacy and softness of touch. You may tickle your bees, and they will rather be pleased than otherwise; but if you press them roughly, they will sting: if you crush one, the peculiar odour which arises from the bruised carcase has a very irritating effect on all his brethren; and they prepare to avenge his death, though with the certain loss of their own lives.

One precaution alone I recommend: Tie your trousers lightly round your ancles with a piece of string (if knee breeches and gaiters are your common wear, so much the better; you want no extra dressing); for such bees as fall on the ground will often crawl up the operator's leg, and when pressed between his clothes and flesh, sting him in self defence. A lady's dress I cannot pretend to regulate.

And now for the time fit for the operation: It should be the middle of a sunshiny calm day, between eleven and twelve, when the number of workers who are abroad is greatest; you will so be in less danger of crushing a number of bees as you cut out the combs; besides, if it is later, such bees as may be daubed with honey will not have time to get themselves set to rights by their fellows. In very hot weather take your honey still earlier in the day; for the noontide heat makes the wax so soft, that it is difficult to handle the combs without spoiling them. A damp, cold day, or one when showers may be expected, should not be chosen, as those bees which

fall on to the ground will be chilled, and unable to rise again to their hive, and so will perish miserably; and I am sure that you would sooner put off your operations, even though you were just about to begin, than risk being the cause of such a result.

So much for the needful preparation, and for the hour of the day to be chosen. But some of my pupils may say, how am I to know when my bees have honey to spare? If they are in hives of the candle box construction, you cannot look in upon them as you may in properly made boxes, which are furnished with windows. But you have their weight to guide you. It is a very good plan to weigh each of your hives and bottom boards before you put bees into them. Mark the weight on the outside, and then simple subtraction will at any time give you the weight of the contents. Even if you have not as yet taken this precaution, you may give a tolerable guess by lifting it a little in your hand, bottom board and all, just before sundown.

In the autumn and winter, when the breeding season is over, the weight of the box will give you the actual weight of honey and comb more nearly than in spring and summer. In the latter seasons, a great part of a heavy hive is filled with brood; a comb from which the young bees are just about to issue forth, is nearly as heavy as a piece of honey comb of the same size: so do not in the summer expect a large quantity of honey from your candle box, though it may be almost as heavy as when full of its original contents. But I will not any longer delay to give you the method of taking honey. I will

reserve what I have to say about the seasons when the greatest quantity may be taken in different parts of this land.

I. When all is ready, blow a few puffs of smoke into the doorway of the hive which you are going to take honey from. If you turn up the hive without so doing, the sentinel bees will most likely fly up into your face; and if you do not take it quietly, you may chance to be stung. The smoke drives the sentinels up amongst the combs, and deprives the whole swarm of its combativeness. How it affects that organ, I do not pretend to say; but so it is. Have an empty hive ready to put down in the exact spot on which the full hive is standing, in order that the bees who are not at work may have some home to go into as they return. They will be surprised, indeed, at finding no comb in it—no cells in which to deposit their loads: you will see them running about in great anxiety; but as the numbers increase, they will gradually cluster inside; more readily, if you put a single comb in the hive to attract them, and remain tolerably quiet till you have done your work, and are ready to return them to their own home. This substitution of the empty hive for the full one is of great importance, as it gives the homeward bound bees a house of refuge, and prevents their straying into neighbouring hives, where they are instantaneously apprehended, and put to death. Then turn up the hive, taking particular care to turn the combs in their own planes, as I told you before in my second letter: place the hive gently down on a table. If the box is not all full of comb,

begin to cut out as much as the bees can spare at the side where the vacant space is; because it is easier to drive the bees from this end of the box, than from the other. Do this with a few puffs of smoke, and as soon as the bees have left the first comb quite clear, cut it from the top of the box by means of the lancet shaped bee knife, which is made just long enough to cut through the combs. Don't let the comb fall down in the box, but support it with one hand; and when it is quite free, lift it gently out, letting it lie on your hand with the side downwards, which is quite free from bees, and brush off with the feathers into the hive any stragglers which may be remaining on the upper side. A good deal of dexterity is required in handling so heavy, and yet so fragile, a thing as a piece of virgin honey comb full of honey; and yet such is the strength of the form made use of, that it is possible to lift a full comb without damaging a single cell. The art seems to be in spreading your fingers as much as possible, in order to support the comb in many different parts. If the thumb and finger alone of a clumsy hand are used to *seize* a comb, and lift it out of the box, they will meet in the middle, and make a great wound in the honey comb, without getting it out. Repeat this, and you will soon make a complete mess of the most lovely comb. It will be reduced to one great mash. So remember, you must handle the combs tenderly, as though you loved them, and as though they had feeling.

By the aid of the bee knife, honey may be taken in the same manner from a common straw hive, if

made of a proper shape. Those which are straight sided, and have a conical top rising to a point, are the very worst pattern. The purest honey is deposited in the very crown of the hive, which should be nearly flat, that each comb may be as nearly square as possible: besides, the bee knife will not work to advantage in a hive of this shape; a large piece of comb will always be left in the top: whilst in a box, or flat topped straw hive, it will make clean work. Those also which are contracted at the bottom are very difficult to get honey from. They are made so, I believe, from a mistaken idea of giving support to the combs. But trust your bees to know how to fasten their combs securely to the top of a hive. They are no bunglers, and make sure work of it. It is utterly impossible to get a comb out of one of these bungling hives, without previously cutting it down the middle; and every such cut spills honey, and daubs your bees. Cross sticks are equally pernicious. Many persons insist on putting them into their hives from the same mistaken idea of supporting the combs. The advocates of this skewering system will also tell you that they are useful for a new swarm to hang upon; but it is no such thing. A new swarm hangs from the very top of the hive, and from live ladders, as it were, of their own bodies, up which the labourers mount without needing the cross sticks. Whenever I am asked to take honey from a straw hive which is fitted with these cross sticks, I always pull them out, which may be done by twisting them round and round, if any of the skewer projects through the outside; I then leave the bees to repair

the damage, and lick up the honey which is unavoidably spilt, and then next day proceed with the operation.

In describing the wooden boxes which I recommended in my second letter, I said that their chief advantage was in the ease with which honey may be taken from them. When a top box is quite full, and the cells sealed over, remove the cover, and blow some smoke with the fumigating bellows down through the bars now exposed. When the greater part of the bees have gone into the lower boxes, remove the top one steadily on to your operation table. If it is quite full of pure virgin honey, and you wish to keep it until you use it, you may get rid of the few bees which linger about their stores, by removing it a short distance from the hive; cover it over with thick cloths, so as to darken it entirely; prop up one side of the hive, so as to leave free exit to the remaining bees. They will naturally come to the light, and fly straight home to their parent hive, so that in a short time you will be left in undisputed possession of your spoil. If the bees cling obstinately to the box which you have removed, you may suspect that the queen is there. You must then cut out the combs one by one, driving them out of the way of your bee knife by your smoking bellows, and taking care not to crush any of them. When you have got to the last comb, you will find all the bees collected about it, and on the side of the box. Smoke the bees off this comb, remove it, and then shake all the bees with a smart blow on a broad board—a japanned tea tray does very well. Hold

it close to the mouth of the parent hive, and you will see what I think is, next to swarming, the most beautiful sight which falls in the way of a bee practitioner. Gently tap the under part of the tea tray; the bees will not take wing as you might expect; the noise will only rouse them from their half torpid state; and as at beat of drum, they will march up in straight lines to the mouth of their hive, which they will enter, making the same buzzing noise with their wings which they do when swarming. Now is the time to keep a look out for the queen. You may often see her returning in triumph to her royal residence in the midst of her attendants. I was perfectly amazed at the order and regularity which the bees keep under these circumstances, when I first accidentally hit on this method of returning the bees to their hive. And I have since delighted very many people with the sight. It must be seen to be credited.

If you find that the box which you remove from the stock has some brood in it, cut out the combs till you come to those which are thus filled, and then return the box to its own place. I never return drone comb, which you may know by the cells being of a larger size; for there is no lack of these non-producers, but terrible consumers, in every large apiary, during the breeding season; but keep them to feed up young chickens or turkeys, who relish them highly. Returning a box with some brood comb in it to its own position has this good effect, that it induces the bees to take immediate possession of the box so returned. They cluster upon the

brood comb, and straightway proceed to fill the vacant space with honey comb. Even if there is no brood to return, I generally tempt the bees to re-enter the top box by placing in it a piece of honey comb. And here is the great advantage of having all your boxes made to the same guage; the bars will then fit all your hives indifferently, and you may transfer one with a piece of comb attached to it from a full hive to an empty box which you wish the bees to occupy.

After the breeding season is over, that is about the end of February or March, the bees will fill the empty brood comb with honey, and when the cells are all sealed over, will often almost entirely desert the richly stored box, which may then be taken with very little trouble. During the breeding season, the loss of the queen, should any accident happen to her during the operation, is easily supplied. There will generally be young queen grubs ready to take her place; or if there happens to be none in the hive, the common egg may have its prospects in life changed from that of a maid of all work to a reigning queen. After the breeding season of course this cannot be done; and the loss of the queen is necessarily followed by the gradual extinction of the whole hive.

The season of the year at which the greatest quantity of honey may be taken will vary of course in the different parts of these islands, as they extend over so many degrees of latitude. In the northern districts they work during the entire winter (though in the English sense this is not an appropriate word.)

The queen rests from her maternal toils, though the workers make no pause in their honey gathering; so the very purest honey may be taken during the winter months.

In the latitude of Auckland the work of a hive is suspended for a month or so, varying of course with the season; whilst in the south, I think their state of torpor will be found to extend over a longer period, and the habits of the bee will differ less from those of their English brethren. Experience, therefore, must teach bee masters what season is the best for a great take of honey.

By means of bell glasses, or in lack of them, small straw caps, pure honey may be got in the height of the breeding season. Put your glass on the top of your box the very day the swarm is put into it; and if it be a strong one, they will immediately take possession of the glass, and store up honey there; while the queen will confine her breeding operations to the box below. It is a very good plan to fix a bit or two of pure comb in the lower part of the glass, as a foundation or beginning for them. This may be done by holding the glass to the fire till it becomes as hot as the hand can bear; then steadily, yet firmly, press a piece of pure comb to it, which will melt where it touches the glass, and setting again almost immediately, will firmly fix the whole comb in its place. Take care not to put the comb topsy turvy, but in its natural position, as it stood in the hive where it was made. The cells of a comb which is built expressly to receive honey, are often not perfectly horizontal, but a little higher at the mouth.

The instinct of the bees leads them to construct them in this way, that the honey, if thin in quality, may have no inclination to run out. Now, if the piece of comb be fixed upside down in the glass, the bees will immediately perceive that it is man's clumsy work, and not their own. It is like holding a quart bottle with its neck downwards, and telling your servant to fill it whilst in that position. These decoy combs, so to call them, should be flush with the lower rim of the glass, so that when it is standing on the inch bars, they may come close to where the bees are clustering. The bees seem to know the proverb, "Well begun is half done," or to have some equivalent to it in their bee notions; they seem to think it wrong to leave unfinished a work which they perhaps think they have begun in the glass: and so these decoy combs often tempt the bees up into a glass which otherwise they would have been loth to work in. The following is a remarkable instance of the power of the bees over the material in which they work. I fixed a piece of new comb in a glass at right angles with the surface; I mean, so that the comb stuck out from the glass towards the centre: it was put on a fine young swarm, and the bees took possession of the glass directly: the following morning I noticed that the comb was not in the same position; it no longer pointed to the middle of the glass, but inclined toward one side: at first I thought I must have been mistaken as to its former position, but the next day I was convinced that my memory had not played me false: the bees were actually shifting the position of the comb; for they

actually shifting the position of the comb; for they went on, day after day, slueing it round, till at last the surface of the comb was brought within a quarter of an inch of the surface of the glass. What mechanical means they used I never could discover. How they got purchase enough to haul the comb round, having only the slippery glass to stand upon; whether they nibbled away the comb on the side towards which it was bent, whilst they proportionately added to it on the other, moulding it as a modeller does his clay; all these are wonders which are beyond me. I should hardly have dared to have recorded this on a single operation; but I have several times repeated it. Take the glass off directly it is full, and all sealed over. The bees always swarm with their honey bags full, as I told you before; and they often take the greatest part of the honey from a bell glass, as provision for their journey, leaving nothing but empty combs where the day before there was plenty of honey. I like the bell glass to stand, as I have said, on the bars themselves, and not on the lid, with small holes cut in it, which is the common way of putting them in, for the bees have a freer passage to the glass. The manner of taking them when full is very simple: I have one of the rims which run round the top board pinned to it, and not nailed: this is removed when a glass is to be taken, and a thin carving knife passed under the top, to separate the comb and the glass from the bars, to which they are generally firmly united. In no other way is it possible to take away a full glass, without certainly breaking the comb, and possibly the glass itself.

The bees which happen to be in the glass at the time it is taken are easily got out of it by the means recommended for the top boxes. N.B. Have the hole in the top board cut so large, that the glass may pass freely through, or else the contraction of the wood, and consequent narrowing of the hole will split the glass.

Glass is now so cheap as to be within the reach of almost every bee master. A barrel containing twelve — one large size, five holding about 15lb of honey when full, and six of a smaller size — can be supplied by Mr. Powell, from the glass-works, Whitefriars, London, for under £2. They are so carefully packed in an oaken barrel, that I have lately received two sets without a single breakage.

Honey may be easily taken from the Sicilian hives, which is a very good form of the straw hive, by blowing some smoke in at the doorway; and when the bees are driven into the back part of the hive, single combs may be cut out till you reach the brood comb, or later in the season a complete section may be removed.

The Ruche a l'air libre will yield its supply much in the same way. Blow a few puffs of smoke in the doorway, take down the shutters, and after driving the bees away by smoke from the part where you intend to commence your operations, cut out comb after comb.

It is impossible to state how much honey may be taken from a well stocked apiary in the course of the year; for it will depend so much upon the situa-

tion and the number of bee masters who happen to be near together. A country may be overstocked with bees, just as a paddock may be overstocked with cattle, and the practical bee master must determine for himself what is the greatest number of hives he can keep with profit.

Where a number of bee masters are living in the same village or district, and each wishes to have a very large stock, it is possible for none of them to get a single ounce of honey; their bees being unable to do more than just rear their young, which is their first instinct, without laying by any surplus, which is their second. So in many countries, therefore, immemorial custom has been called in to regulate the number of stocks each bee master is allowed to keep, and which is proportional to the number of acres which he holds. Some such arrangement as this will perhaps be necessary here in the cultivated districts; experiment and a mutual good understanding must determine the ratio which it is for the interest of all to adopt. But there is hardly any limit to the quantity of honey which may be procured from an isolated apiary, favourably situated near an extensive tract of wood land. I will give an example:—

A single swarm was placed in such a situation as this in the summer of 43-44; by September 44 it had yielded 311b of honey: as it was a single stock, it was not taxed severely. The following little table gives the amazing produce of it and

its offspring, up to the respective dates annexed to the weight of honey:—

September	44.....	31lb
..	45.....	205
..	46.....	721
..	47.....	1,211
		2,168

If this, the produce of a single hive, does not make English bee keepers open their eyes with astonishment, I shall be surprised. It certainly should encourage New Zealand bee masters to study the gentle craft. Nor do I think the limit of productiveness has, even in that locality, been reached as yet. In the neighbourhood of towns, or wherever a number of people are living near together, it is idle to think they all can keep large apiaries. I never like to give a swarm to a friend living in such a situation. Often when I state my reason for refusing to send my pets where I am sure they would be starved, I am met by such an answer as this: "I have a nice little garden with plenty of flowers in it, and I always see a number of bees there, who seem to do very well." "That's it," I reply. "There are plenty of bees every day, and all day, in your garden, and those of all your neighbours; and although you may call a piece of ground your own, and your flowers your own, you cannot establish such an exclusive privilege in favour of your bees. Every bee has a free right of common wherever its wings can carry it. There is no trespass ordinance which can touch these small cattle; and

so I should advise you not to try to keep bees in town, except to a very limited extent for the sake of observation. If you go into the country, you shall have bees, and welcome."

Indeed one of the greatest pleasures of bee keeping lies in dispersing them as widely as possible. From the apiaries thus established in all parts of the country, some swarms are sure to escape, and take to the bush. And when our woods are fully peopled, then will be the time for honey without stint, and wax in such plenty as to become an article of export. The maories will make capital bee hunters; their accurate power of observation exactly fits them to track a bee to its home; and their ingenuity, to adopt the best method of preparing honey and wax. I, for one, will do my best to put them in the right way, as well as to supply them with swarms. And I trust every bee keeper who reads this will do the same. We have hollow trees in abundance. Many of them at the Bay of Islands district are already tenanted by bees, and honey in considerable quantities has been brought in by the maories for sale. I have heard of an American captain, who ought to have known better, who set about taking honey from a tree by firing a blunderbuss loaded with small shot at the place where he saw the bees the thickest. A little smoke and a tomahawk will be more efficient weapons in the hands of the maories; and they will learn to track the bees to their home after the American fashion, which is this: They put a piece of honey comb in an open space in their woods as a bait or line to the bees,

who are soon attracted to it if their hive is within a reasonable distance. They gorge themselves, and then their instinct leads them to make the best of their way homewards. The direction of their flight is accurately marked; the same operation is performed in another place at right angles to the line of the first bees' flight, and the intersection of these two lines leads the hunter to his prize. Others, I have heard, catch the bees while feeding on the bait, and with a little gum attach a small piece of swan's down to its body, which, without materially impeding its flight, makes its course through the air more easily observed. By hook or by crook the maories will find the wild bees readily enough when the woods are full of them. They, rather than the pakehas, will be the bee hunters; and I only mention the subject here, to show that the woods, those bee houses of nature, and not private apiaries, will yield the greatest supply of bee produce.

One more point remains in connection with the subject. When an apiary is fully stocked, and a district contains as many bees as it can profitably support, what is to be done with the increase? Shall we suffer all the swarms to fly away in the swarming season, or shall we revert to the barbarous old English custom of putting down our stocks in autumn; that is, basely murdering with a sulphur match those who have worked for us all the summer? It has been the way of the English bee keepers from the time of Shakspeare; second part Henry IV, 4th act, 4th scene: yet, though a time honoured practice, I trust it will never obtain in this new country.

But the remedy belongs more properly to the subject of my next letter—the union of stocks—rather than to this present one; though by their union the greatest part of the yearly yield of honey will be obtained.

VI. Uniting Hives. — The union of stocks is a branch of the craft which does not so much belong to the young bee master as to those who are in possession of fully stocked apiaries. The former is of course anxious to multiply his stocks as much as possible; the object of the latter is rather to increase the produce of his hives than their number. The former may easily obtain his object; for one hive this year he may have from ten to twenty next, if he hive each swarm separately: I have known as many as five and twenty in a year. The latter, if he is to attain his end, must use a directly contrary course; which I am now going to speak about: We will suppose he is living in a district which will not feed above a hundred hives, and that he begins the swarming season with his twenty five old stocks. The average increase of ten to one would give him far too many, even after he has dispensed (remember, the physic in one's own bottles) to his friends, acquaintances, and others, all that they require. What is he to do? Is he to kill the young swarms, as I have heard some New Zealand bee masters seriously propose; or is there any means of preventing such an excessive swarming? The first remedy would be barbarous in the extreme: the second remedy is impracticable, at least to any great extent. It is not true that a great increase of temperature, and a

want of room, are the sole causes of swarming; and that if the one be kept low, and the other freely given, the swarming breed may be entirely prevented: For I had last year a very fine swarm from a French hive which was thoroughly screened from the sun, and had all its shutters down at the moment when the swarm rose: in fact, the bees were as it were hanging with their combs under a four legged table; for the French hive is nothing more when all the shutters are down. The temperature of the hive could not have been much above the surrounding air. This hive, too, at the time it cast the swarm, had plenty of room; so that I would assume that swarming cannot be entirely prevented, though it may be checked. Nay, I would go further, and say, that I would not wish to prevent it, but would rather strive to turn it to the best account. And how should this be done but by the union of stocks?

More honey may be got from one very strong hive —say with 40,000 bees in it—perhaps than from the same number of bees, if divided into two or more stocks. The reason of it is this: The queen bee lays from 10,000 to 30,000 eggs in the year. In a stock containing 5,000 bees, almost all of them in middling years will be busy in rearing the grubs; for they are such good nurses, that they think it their first duty to feed the young: gathering honey is their second. In due season, when a number of these foster children come to maturity, a swarm goes off. You have two queens, each with 5,000 bees, in separate hives, all engaged in rearing the eggs which the two queens lay all through the summer.

They have no time to lay up surplus honey, and in a very dry summer will even chance to die, if they are not well fed. Had they all been kept together, 5,000 bees who are engaged as nurses to the grubs of one queen in the weak hive would do the same in the strong one, while 5,000 more would be continually engaged in storing honey. So my practice is as follows: I keep all my hives as strong as possible, by preventing their swarming as much as I can; and by choosing to have my fresh stocks of the year few in number and powerful in bees. So I unite all the swarms which rise on the same day. Often it will happen that whilst the first swarm is in the air the second will rise, and they will join together without any care on your part, lighting on the same bough. Old bee masters give long directions as to the mode of separating them again into two swarms. I shall do no such thing, but be glad of their voluntary union. The two queens will most probably settle the matter between themselves; in that case the weakest, who goes to the wall, will be seen lying dead before the mouth of the hive the following morning. Sometimes, however, a swarm will the next day rise from this new hive, which I think is occasioned by one of the queens rushing out of the hive, from fear of her more powerful rival, and being followed by her own party. To prevent this I always capture one of the queens of a self united swarm, if I can see her, though it is of no great consequence, as it is not often that a self united stock again separates, if you give them a hive sufficiently roomy.

When two swarms which have risen on the same day, and which you intend to unite, are each safely hived, leave them for the evening near the place where they lighted, remembering to screen them well from the direct rays of the sun; for, as I told you in my letter on swarming, the action of the direct rays of the sun is the usual cause which makes swarms run away after they are safely hived. After sundown the same evening spread a cloth on the ground, near where the hive stands which you wish to double; then take the other steadily in your hands away from its bottom board, and strike it with a smart blow upon the cloth; this will knock all the bees out in a mass; they will not take wing, but will remain lying on the cloth whilst you steadily and carefully place the other hive over them. Three or four pieces of wood must previously be placed on the floor where you strike the bees down, that they may not be crushed by the edges of the box which you put over them; then lap up the corners of the cloth, and your part of the work is done. You will hear a loud humming noise, and the bees whom you have dislodged will ascend into the new hive, and peaceably amalgamate with the other swarm. Just at dusk, carefully unlap the cloth, and if any considerable cluster of bees is gathered outside of the box, as is sometimes the case, brush them gently down with a feather, or with your finger, if you prefer it, and guide them under the hive; for bees are tractable creatures, and gentle withal, if they are gently handled; but they are not deficient in courage; if you provoke them through

ignorance or carelessness, you must take the consequences. When they have all gone up into the hive, put them quietly on their bottom board, and move them into your apiary where they are to stand, or else make this your first work the following morning. Give the double stock sufficient room, and they will set to work vigorously. Two contiguous hives in my apiary united themselves this year; one swarm deserting four or five combs which they had begun to build. It may be that they had no queen, for I found no grubs in the cells which they left. This double hive has since received a fresh accession of strength, a large portion of another swarm having joined them, going "promiscuous like" into the hive, where they were, to my surprise, well received. Had a single bee pokanoad into the hive, she would have been immediately seized, and put to death. And now this stock is the very best I have in my apiary, filling four boxes, and working away vigorously too in a glass, which I put on the top of the original hive the day it swarmed. Fifty strong hives are worth more, and will give more honey, to their owner than two hundred and fifty weak ones.

Stocks may be united in this same way, though they do not swarm exactly on the same day. In this case you will of course knock the fresh swarm on to the cloth, and place over it the hive in which the combs are already begun. It is as well previously to turn up the latter hive (in the plane of the combs, remember), and give the cluster of bees a good sprinkling with syrup. The new comers will be at once attracted by the smell of the syrup; will

mingle freely with the daubed bees, who have something else to think of than to repel intruders; they will help to set them to rights, by licking off the syrup; and though you may call it a selfish act of kindness, it will cement a friendship between those whom you wish hereafter to be peaceable inmates of one home.

The union of swarms in this manner will to a certain extent prevent your apiary from growing to an outrageous size. Such hives as exhaust themselves by swarming, should have their old black combs cut out, and they will then be ready to have a new swarm put into them. Don't let an exhausted stock stand doing comparatively nothing in your bee house, when you have daily fresh swarms ready to tenant the house, if you take the trouble to put them in possession. It may be done, not by the ejectment of the original holders, but by reinforcing them by a fresh colony. The number of your hives may be brought still more within limits in the autumn, in the following way:—If you have ninety hives which you wish to reduce to thirty, you must join to every hive which you intend to leave its right and left hand neighbour. I think May is about the best season for doing this; but the proper time will vary in different districts. It should be after the breeding season is over, and when the hives are the heaviest. Cut out the combs entirely from the side hives by the aid of your three instruments, the smoke-bellows, the bee knife, and the bunch of feathers, and return the bees, as directed above, into their now impoverished hive. Place it where it stood

before, till the evening, when they will have formed a large cluster inside the hive, just as if they were a new swarm. A stranger coming to see your apiary, and not knowing what you had done, would think this your very strongest stock; for the entrance will be crowded by bees rushing in and out, carrying away broken bits of comb, and doing their best to set their pillaged house in order. They are nothing discouraged by what has happened; but, like a sensible man under similar circumstances, make the best of it, and always seem to me to be singing all day long, that song which I wish were better known, or rather more generally acted upon, by us men creatures—"Try, try, try again." More than once I have allowed them to make the trial. I have fed them for a day or two with the refuse combs, which they thankfully accepted, in lieu of the thirty pounds or so which I took from them; the feeding was necessary to enable them to get their new combs built with as little delay as possible. The season proved favourable for honey gathering, though this experiment was made in the beginning of winter; in fact, the trial succeeded, and this family of persevering bees are now one of my best stocks.

But the object of the bee master who has a fully stocked apiary, should be not only to take a large quantity of honey by this process, but also to reduce his stock to the number which he wishes to swarm the following spring. So at sunset he should unite the bees of this deprived hive to its next neighbour in the mode last described. The doubled hive should be moved midway between the places lately occupied

by the two. If three hives are united, do not displace the middle one, but take away altogether those which you have emptied. The bees will then have no difficulty in finding their new home, especially if, for a day or two after, you prop up the front of this hive with some little wooden wedges, so as to make the doorway much handier. But the greatest confusion and loss will be occasioned by the attempt to join bees from different parts of the apiary — "For bees that have not swarmed voluntarily return to the place they have been accustomed to, even after having been shut up for months. The same thing happens if you unite swarms distant from each other. Next day, or the day after, you would have the mortification to see the bees return by hundreds to their old residence, flutter about for a length of time, and lose their lives, either by falling down from fatigue, or throwing themselves into the neighbouring hives, where they are put to death. Not having left their new dwelling with the same precaution that a swarm uses to reconnoitre the one it has chosen, or that has been given to it, and supposing themselves at home in spite of the disorder of the night before, they rush out on a rapid flight, and returning from their excursion, go back to the place of their ancient domicile; and thus the purpose of fortifying your hives, and of preserving them by uniting them, is defeated. I have frequently tried to unite distant hives, and always met with this result."

The above extract is from the "Bee Preserver," by Jonas de Gelien, Edinburgh, 1829, page 56; an author to whom I can never sufficiently acknowledge

my obligations. I have learnt more from him than from any other writer—though not so much as from my masters, the bees. He studied their habits sixty-four years, and communicated the result of his observations, in extreme old age, as a duty which he owed to the world before leaving it. I have tested most of his observations, and repeated his experiments, and I never found one of them to fail. From him I learnt the method given above of uniting stocks. Before I read his work, I used to do it by stupifying the bees of one hive with the smoke of the puff-ball. *(Boletus maximus.)* But I find the smoke of linen rags sufficiently powerful to enable you to get the necessary command over your bees, and I now never use anything else. In countries where the winter is cold, and the bees are torpid during several months, this method saves the lives of those bees who have not made enough honey to last the winter. You get for yourself what you may find in the hive, as well as the wax; and the doubled or married hive, as the French call it, wonderful to tell, will consume no more honey than the single stock. Each bee takes half-rations, as it were: their vital heat is, I believe, sustained by their being packed together close in the hive; and they, therefore, do not need so much food as an internal stimulant. I have repeated this experiment over and over again, and have always found it so. In this country the union of stocks will give a bee master his main supply of honey; and besides, when his apiary is fully stocked, will enable him to reduce his stocks within limit, without having recourse to the murderous sulphur match. He will

get as much honey by this method as he could by the old. His remaining stocks will be stronger, and work better, during the winter: above all, he will not have the murder of thousands of bees at his door. In certain districts of England I got this plan pretty generally adopted. I myself instructed a cottager, Joseph Barnett, of Cumnor, in the method of joining stocks; and sent him round in the harvest season to the neighbouring bee keepers. Where they would not adopt it themselves, his plan was this: he said, "I will give you a shilling to let me take your honey for you, if you will let me take the bees away with me." "Take them, and welcome," was the usual answer; "and much good may a parcel of bees, if you don't kill them, do you, without the comb." I had a small deal box made to carry them in; and when he got home, he united them to my own stocks.

Some people thought that it is impossible to introduce a new system, like that which I recommend, generally among the cottagers, who are so much wedded to the ways in which their fathers have walked before them. With this feeling I am the last to quarrel; but I was resolved to try what I could do; for I was sure that if I gained my end, I should benefit them by the change. Now success, far beyond what any teacher of new ways has a right to expect, has been granted to me. As a proof of this, I will give a conversation which took place the other day between Joseph Barnett and myself:—

"Well, Barnett, what do the people about Cumnor now think about our plan?"

"Oh, Sir, they take to it wonderful."

"Why, how is that? they would have nothing to do with it at first."

"Yes, Sir; but they saw this year that my double hives—what you call the married hives—were the first to swarm, whilst many of them got no swarms at all: So this year they have all smoked their bees instead of burning them."

"Well, how many hives have you married this year?"

"Not so many as last, Sir."

"Why, how is that? I thought you said they were all taking to it."

"Why, you see, Sir, my eldest son is so deadly fond of smoking bees, that I have given the job up mainly to him; and he has got many a shilling this year by taking up the stocks of the people round about me."

"Well, I am glad to see, Barnett, that he is walking in his father's steps, and makes an honest penny by saving the bees' lives: but do not call it *deadly* fond, though I know what you mean—you should say, *lively* fond: for both he and you prevent much bee murder."

Now, if the inveterate prejudices of an English labourer gave way before the plain advantages of this method of taking honey, I trust that every New Zealand bee keeper into whose hands this manual may chance to fall, and whose mind, as far as bee management is concerned, is like a piece of blank paper, will give this method a fair trial, instead of bringing in here one of the most barbarous usages of the old country.

A few more words, and I have done about the union of stocks.

If two bee keepers, living a mile or so apart, will agree as to the time for taking up their surplus stock, they will find it mutually beneficial to exchange the bees from which they have taken the honey, each bee master uniting to his own stocks the bees which have come from a distance. It will do very well, as I have said above, to unite adjoining hives by placing a double stock between where they stood; but it is better still to bring them from a distance, if possible; for the bees will more readily get accustomed to their fresh home.

VII. Feeding.—In this country the bees are generally, I am thankful to say, able to feed themselves all the year round, and lay up a surplus for their master likewise; so that I shall not say much on this head. There is hardly any season, at least in the northern parts of the island, in which the bees do not work nearly all the year, as there is a perpetual succession of flowers in the woods: so whenever a bee master has a hive which is dwindling away, he had better unite it to its next neighbour, rather than attempt to restore its vigour by feeding. Indeed, in nine cases out of ten he will find that the loss of the queen, and not a lack of honey, is the cause of its failure; and after uniting the bees, as explained in a former letter, he will have several pounds of honey, and at least a pound of wax. Unite, rather than feed, when you have your apiary fully stocked. But as there are three or four circumstances under which feeding may be re-

quired even in this country, I must not altogether pass the subject by; and they are these: 1st, When you have only one stock hive in your apiary, and some accident has happened to it; the combs, perhaps, have all been broken down by clumsiness in moving it to its new station, or what not. In this case nothing is easier than to feed it by placing before the hive, on a fine day, the honey combs which have fallen. The bees will soon empty them. If you think they want some more food, boil some sugar with water or mild beer into a syrup, about the consistency of thin treacle; do not use the very coarse sugar—for this the bees do not like—nor boil the syrup longer than is necessary to dissolve the sugar: stir it also, that it may not burn. Then pour some of this syrup out of a bottle, or tin made like an oil feeder, into the cells of the comb which has been emptied, and place it before the hive as before. Remember that there is no better food for bees than honey, when it can be got (it is mother's milk to them), nor any better feeder than a piece of empty honey comb. It prevents the bees daubing themselves. But this out of doors mode of feeding does not do when you have more hives than one; for all the bees will help themselves, and the strongest hive will get the most. So you must adopt another plan. Put the comb, with honey or syrup, in an empty bee box, and then place the hive which you wish to strengthen on the top of it; they will take it all up during the night. I have known a hive to take up as much as 3½ lb in one night. It was a hive which I doubled one autumn in England, which had very little honey,

and I wanted to feed it up to the weight which would enable it to pass the winter in safety. If you have a straw hive with a hole in the top, for working caps or glasses, it is a very good plan to give the bees their additional supply, by placing it in combs on the top of the hive, and then turning another hive over them like a cover.

2dly, A second time when feeding is necessary, is if a succession of very bad weather sets in after a new swarm has been hived. I have told you that each bee swarms with her honey bag full. They convert this into wax during the first and second days. You may observe that very few bees stir out the first day; after that they want a fresh supply: and if by stress of weather they are prevented from going abroad to seek it, a few pounds of honey or syrup will be well bestowed, and amply repaid. It is not like an alms given to an idle beggar, but a seasonable loan to an industrious tradesman. I have seen the following very neat method of giving food to a hive: A large gimled hole is driven from the back of the bottom board, in the thickness of the plank. The outside of this hole is plugged up, and a sort of pond cut in the middle of the bottom board within the hive, so deep that the bottom of it comes below the level of the gimled hole. Outside the hive a round hole, tightly fitting the neck of a common bottle, is cut down into this same underground (or rather underwood) passage. If the bottle is filled with syrup, and turned topsyturvy into the hole, the fluid will run along the channel, and fill the pond, which should not be above half an inch broad, and

three or four inches long. When the bees suck up the syrup down to the level of the pipe, a bubble of air will pass up into the bottle, and a drop of syrup will come down, after the manner of a common bird glass. Feeders of zinc, to put at the door of the hive, or on the top, may be made on the same principle.

3dly, Sometimes your hives will need a little feeding when a severe drought comes on, such as we had in the summer of 1846-7. Not only are the bees, in good situations, unable to lay up any surplus honey in these seasons, but they cannot even get enough to feed their grubs, and so cast them out to perish in front of the hives. This seems cruel, but it is a real kindness. It is better that they should die at once by exposure, than drag on a miserable half starved existence for some days in their cells. At such times, a few pounds of food will enable your bees to rear their young, and they will amply repay you when the first shower comes. I do not think we shall often have droughts in this country; and even when we do, the bees will get plenty if they are near extensive forests. It is only in the open country where they are mainly dependant on the produce of clover paddocks, &c., that they need such attention in the time of drought.

4thly, An observatory hive, if you have one, will need constant attention. As the bees can only make a single comb in it, they are of course unable to lay up a large supply against "a rainy day;" so do not let the cells in which they store honey ever get quite empty; if they have a large quantity of brood to

feed, a day or two of very bad weather will make a heavy drain upon their scanty stock. You may either introduce a trough filled with syrup in at the door, which is left for the purpose at the back of the hive, or place a piece of comb on the top of the hive: take out one of the plugs which are there for the purpose, and cover it over with a glass or box, and the bees will soon avail themselves of the seasonable supply. I must repeat, that there is no food so good as honey for a weak stock; so do not press your honey combs; but after all has drained out that will, keep them in a secure place, and give them, either as a treat all round, to your whole apiary—in which case you have only to put it in a dish in front of your hive on a fine day—or as a private feed to your weak hives; and then you must give it in such a manner that other bees may not be attracted by the smell: for if plunderers are led into the hive which you are feeding by the scent of the honey, they will not only carry off all that you intended for other mouths than theirs, but not content with this, will empty every cell in the hive into which they have been attracted, and very often kill all the bees into the bargain, who can make but a feeble resistance against the pillaging hordes of their stronger neighbours.

There is one other sort of food which bees require, and which they cannot do without, viz., water; which you will do well to supply them with, if they do not find it near their hives. It is bad to have your hives quite close to a large river or pool of water, for thousands of bees will be beaten down into the water by

high winds, when they are returning heavily laden to their hive; but a small rivulet is a good thing to have near: in the summer season you will see a great number of bees standing on any little stones or bits of grass which may be by its edge, drinking to their heart's content. In defect of a stream, they will find out any pump or water butt which is handy to their hive, and satisfy themselves there; or even at places where the water they get is stagnant, or even impure. But as water carrying is heavy work for bees as well as for men, it is well, if their natural supply is far off, to set pans of water near their hives, filled to the level of the water with stones or moss, lest the bees should fall in when they alight to drink: a very convenient means of supplying them is to have a small wooden trough, with a piece of wood floating on the top of the water, not getting light, but so that it will always sink to the water level; the bees will perch on this board, and drink their fill from between it and the sides of the trough. I was led to think that bees are fond of salt water, and I placed near my apiary one trough of fresh, and one of salt water: for one bee that went to the fresh water, there were twenty at the salt lick. But they seem to be very capricious in their tastes; they will for some weeks be constantly at the salt trough, and then all of a sudden they seem to have no more need for salt provisions in the domestic arrangements of their hive, and it will be entirely deserted. The time of these "fancies" should be noted in the bee register, and we may then hope to learn why their "tastes differ, and appetites vary," in this manner.

I suppose it has something to do with the food which the young grubs require, as their nurses take up the greatest quantity of salt and water in the breeding season. There is a notion among the bee keepers in the Isle of Wight, that every bee goes down to the sea to drink every day. This is, of course, an exaggeration; but I have often seen a number of bees licking the mud in a salt water creek where the tide is out. So much for bee feeding.

VIII. Preparing Honey and Wax for Use.—As you take the honey combs out of the hive, separate those which are quite full from such as are only partly so; those which are pure virgin combs from such as are dark in colour, or have some of the cells filled with bee bread. This separation may easily be made by having several dishes or milk pans by you, in which to lay the different sorts of comb as they come to hand. By making this division at once, you will save a good deal of honey; for if all the combs are heaped together in one vessel, the dark combs, which are the hardest, will crush and otherwise injure the pure virgin combs; (as in the ways of the world, the weakest go to the wall, and these weakest are not seldom the best). In them the wax is very thin and fragile, hardly able to bear the weight of the honey which they contain, and sinking immediately under any external pressure. Often you will find two sorts of honey comb, the pure and the impure, in the same cake. Separate them at once with a sharp knife. Every subsequent handling of the combs is attended with considerable loss of honey, to say nothing of its being at best but a sticky job;

so that it is well to get it done at once, and make one handling do for all. If you take a top box or a glass entirely full of pure honey, you need not be in any hurry to cut it out; it will keep better where it is, if only you place it in security, where no bee on a foraging excursion can possibly find it out. If once a single scout reach it, he will soon be succeeded by a whole fatigue party, who will carry off their prize in doublequick time. If you doubt this, leave twenty pounds of honey comb before your apiary, in the middle of a warm day: come again in an hour or two, and if you expect to find much, you will be gloriously disappointed.

After a large take of honey, when all the dishes, as they are filled, have been carried into the house, then there will be a noble sight to see. When describing that event, so important in a farm house, viz., killing the great bacon pig, Cobbett says, in his graphic style, "NOW THE HOUSE IS FULL OF MEAT;" and he forthwith proceeds to wisen with the good housewife as to the disposal to the best advantage of every part of the hog, from the pettitoes up to the noble flitch. So now I must teach you how to dispose of "your house full of honey."

The pure virgin combs fetch the highest price, and are more wholesome to eat. If you are in the neighbourhood of an English town, you will find a ready sale for as much as you choose to take in, for some time to come; but to secure this sale, they must be perfectly clean and unbroken, fit to set upon an emperor's table. Who likes to see a pat of butter with the print of the cow obliterated by that of a

great thumb? And, believe me, this owner's mark is still less sightly in the midst of a piece of honey comb; especially as the honey cannot, like butter, be made up again, so as to get rid of the ugly print. If you have more pure honey comb than you can sell or use yourself, run it out in this way: give two cuts to each comb with a sharp knife, so as to slice off the covers of every cell. This is in fact uncorking all the bottles in which the bees have stored their honey. Then set the sliced combs in a sieve or colander to drain, with a vessel below to catch the honey as it runs. If you have large earthenware pots to store your honey in, it is best to let it drain from the sieve or colander into this at once: you will thus avoid having to pour it from vessel to vessel; which, as I have said before, is always bad, as honey must be lost by every such transfer.

When all the honey has run from the virgin combs—and almost every drop will drain from them if you cut them sufficiently—place the comb in the middle of the apiary on some fine day, and the bees will take care that none of it is lost.

They will extract every atom of honey from the wax: all that man can do is to press out the drops. The instruments with which he works are not so fine as those of the bees, and so he cannot make such a neat job of it. Don't think it is a waste to put your drained honey combs before your bees for them to lick clean; or fancy that, by pressing the combs, you might have got more honey from them. You would have got foul honey by pressure; the bees only lick up what is perfectly pure, and nothing is

wasted; for the bees do not consume any more, because they have their hive well stored. You only pour honey from one pot into another. You lay up sixpences in a savings bank, from which you may draw pounds in a proper time. The bees will leave your wax in a fit state for melting, of which more anon. I have not yet done with the honey:—

The virgin honey is the easiest to extract, and is of course the finest, because you get it purest from the comb. Honey equally pure is stored by the bees in foul combs. The question is, how to get it out. It is like pouring off liquor from a bottle which has a great sediment in it. You must do it carefully, or a muddy stream will flow instead of a pure one. Remember what it is that has made the cells foul. Young bees have been bred in some cells, and bee bread has been stored in others. The old careless way of pressing all the combs together, good, bad, and indifferent, gives you nothing but second rate honey, mixed with a great deal of stuff which it will not do to name, or even to think of, while you are eating it. Hear what good Sir John More said, 140 years ago, of this careless way of extracting the honey:—

"In Hampshire, where there are great quantities of bee gardens well stock'd, the bee man does not take the care as is here set down, but takes all the honey combs out of the hive with a light shovel; he puts all into a tub, and pounds 'em all together; and then, putting it confusedly into a strong haired bag, does violently press out all that will run; and this (having first its season of heat over the fire) they

put in barrels or other vessels to work. This done, they put what remains in the bag into a trough or other vessel, and wash it for meath. When the sweetest is all washed out, being crushed dry, the balls they try for wax."

Let this, then, be one of your standing rules: never press your honey comb; slice your dark combs, as I told you to do the virgin ones, and pure honey will run from them. If you press them, you get the bee bread and other impurities mixed up with it. When all has run that will, let the bees pick up the remainder, and then put by the impure combs apart from the combs against you try down your wax.

Where apiaries are established on a very large scale, and honey is abundant, it will be found convenient to have a tin vessel made like the woodcut, to strain the honey in large quantities directly it is taken from the hives: (*a*) is a funnel of tin which will hold a hundred weight or two of combs, which should be placed in it directly they are sliced, in such a position that the honey may drain freely from them: (*b*) is a strong open strainer of perforated tin, on which the combs rest to prevent them pressing upon or clogging up the finer strainer (*c*), made of coarse muslin or gauze stretched on an iron ring. The funnel contracts below the second strainer, and ends in a pipe, which goes into the honey pot (*d*) placed below to receive what drains from the pipe. This pipe should fit pretty closely in a hole cut in the top of a temporary wooden lid made for the honey pot, or the bees will soon be attracted by the smell, and carry away the honey as fast as it drips.

The tin vessel itself should also have a lid. Then the whole process may be performed without dust or anything else marring it.

You'll be surprised to find the great difference in the honey which your bees make at different times of the year. The best, perhaps, that ever I tasted, was made in the neighbourhood of a number of almond trees while they were in full flower. It is one of the few cultivated plants which materially affect the quality of the honey; and may be profitably grown to a great extent in this country. The honey, also, from clover paddocks is very plentiful, and beautifully white. Many native trees, too, are excellent honey producers; whilst some few others impart to the honey a peculiar, and to some people a disagreeable, twang. This sort should of course be set apart for physic, as nastiness seems to be one of the essential virtues of medicine; and you will have plenty of use for your nasty honey as physic. In one place, last year, sixty pounds of honey were used for cough mixture alone. Bees have not long enough been observed in this country to say with certainty from what trees they get the different varieties of honey. But there is one peculiarity in a great deal of the New Zealand honey, which I must mention, namely, its great readiness to crystallize. In some districts whole boxes will be found with the honey crystallized in the cells in one solid mass, as difficult to cut through as a very solid cheese. The virgin combs filled with this species of honey are exquisitely white, and the honey of such good quality, that it may be eaten quite as a confection. The comb, when cut

through, shews hardly any appearance of wax; it seems one solid mass of sugar; and yet the shape of the cells is clearly discernible. The whole comb may be carefully dissected, like a puzzle, or rather, the separate hexagons of sugar which have been cast in the cells; though it would puzzle the cleverest geometrician in the world to reconstruct them. No one can imagine the beautiful appearance of such a comb unless he sees it; and it is equally pleasing to more senses than one. But yet the bees cannot eat it. Place a piece before the most populous hive, and though the bees will carry away a small portion of honey, which they manage to dissolve, still they leave behind a mass of sugarplums, which they can no more reconvert into syrup fit for their consumption than they could a solid loaf of sugar. So that I believe a hive amply stored with this sort of honey would die of starvation, if they could get no fresh supplies.

You can be in no doubt what to do with this sort of honey comb. It will keep any length of time, if the combs are wrapped up in white paper, and carefully packed away, or put, a number of them together, in a box. It is one of the best specimens of New Zealand produce with which to surprise and please our friends at home. But it affects what I am now telling you about running your honey in this way. It is difficult, nay impossible, to get it from the impure combs by any of the ordinary methods; it will not run: pressure is equally useless. The only method I know is to put combs and all into a kettle, with just enough water to prevent their

burning. Simmer them gently; then pour through a sieve: this will stop the grosser impurities, though, if the combs are old, a great deal of nastiness will have been mixed up with the soup itself. Let it stand till cold, and then the wax will have formed a cake at the top, like half melted ice. Take this off carefully, and then clarify the honey which is below in the ordinary way; that is, simmer it slowly, adding more or less water, according to the consistency you wish to bring it to, skimming off the scum as it rises. To prevent the honey burning, which will give it a dark colour, it is a good plan to place the vessel with the honey you are clarifying within another pot of water, gluepot fashion. The result of all this trouble will not be equal to the spontaneous production of the virgin combs: and yet I have never been able to hit upon a better plan of treating the dark combs which have crystallized honey in them. You may keep this inferior honey to feed your weak stocks with, and to use as physic. Dark combs which have liquid honey in them you have only to slice, and let drain, as I told you above.

And now for the second article of bee produce—the wax. It is by far the most valuable of the two: for this reason—because there will be an unlimited demand for it. Solomon says—"It is not good to eat much honey:" Proverbs xxv. 27. And as with individuals, so with commerce: there is soon a glut of honey, but an almost infinite demand for wax. Australian bee keepers have found that it barely pays to export honey to England; but wax, as well

as tallow, will be one of their staples. I, for my part, wish all the world were lighted with wax candles; and that the last of the snuffers were preserved in some national museum. Such a happy day is, I fear, far distant; but still we may live to see the day when every one in New Zealand burns a wax candle of his own making. The bees we have at present in New Zealand are only the seed of that vast crop which will one day fill our woods. When every hollow tree almost is tenanted, and the maoris have learnt the way of tracking the bees to their homes, the quantity of wax which will be brought to our markets will be enormous. That which can be obtained from tame bees is comparatively small. Not much more than a pound can be got from the combs of a hive which, if full, would contain twenty or thirty pounds of honey. Still, "many a little makes a mickle." So no careful bee wife ought to waste a single ounce of wax. Have a box in your bee house into which you may put all the scraps of comb which would otherwise be lost, with all the refuse from which the bees have licked the honey; then have two or three melting days in the course of the year. Besides the combs from which the honey has run, you may have a considerable quantity more, if you carefully save up all belonging to hives which die off in the winter (and in a large apiary there will be many such, from the loss of the queen, and divers other causes); you may also cut out several empty combs from most of your hives, when you turn them up in the spring, for the purpose of cleansing the bottom board, and thoroughly examin-

ing into their state. All these combs should be divided into three, or at least two, divisions. First, pure white comb; secondly, comb of but one year old, which has indeed been bred in, but in which there is still more wax than refuse; thirdly, old black comb, and those in which there is a great deal of bee bread. The structure of this black comb is very curious. Lay a piece in the sun till it gets a little softened; you may then easily pick it to pieces cell by cell. You will find that each cell contains four or five layers of the silk which the grub spins in its transformation. These are moulded into the shape of the cell; and it seems to me, though I can hardly believe it, that the bees have some means of taking up the wax of which their cells are at first wholly composed, when the silky substance is ready to take its place; "waste not, want not," being one of the bees' standing mottoes.

The practical mode of preparing the wax I shall give in the words of the same Sir John More, whom I have quoted above.

"The manner of ordering the wax is as followeth:—Take the wax and dross, and set it over the fire in a kettle or cauldron that may easily contain it; then pour in so much water as will make the wax swim, that it may boil without burning; and for this reason, while it is boiling gently over the fire, stir it often; when it is thoroughly melted, take it off the fire, and presently pour it out of the kettle into a strainer of fine thin linen, or of twisted hair, ready placed upon a screw or press; lay on the cover, and press out the liquor (as long as any wax comes) into a

kiver of cold water; but first wet both the bag and the press, to keep the wax from sticking: at the first cometh most water; at the last most dross; and in the middle most wax.

"The wax growing hard, make it into balls, squeezing out the water with your hand. When you have thus done, break all the balls into crumblets, and in a skillet or kettle set it over a soft fire; while it is melting, stir it, and skim it with a spoon wet in cold water; and as soon as it is melted and skimmed clean take it off, and having provided the mould, first warm the bottom, especially if the cake be small, and besmear the sides with honey, and then instantly pour in the wax (being as cool as it will run) through a linen strainer: when you come near the bottom, pour it gently till you see the dross come, which strain into some other mould by itself; and when it is cold, either try it again, or, having pared away the bottom, keep it as it is for some use or other.

"When the wax is in the mould, if there be any froth yet remaining on the top, blow it together at one side, and skim it off lightly with a wet spoon.

"This done, set not the cake abroad where it may cool too hastily, but put it in a warm house not too far from the fire; and if it be a large cake, cover it over warm to keep the top from cooling, till the inward heat be allayed; and so let it stand, not moving the mould till the cake be cold; if it stick, a little warming of the vessel or mould will loosen it, so that it will presently slip out."

I have but little to add to this. In practical

household wisdom, our grandfathers were certainly our betters. I would only recommend you not to put your very fine wax in with the common wax; but reserve it for an easier process, of which I will speak presently.

I have found it a good plan to put all the wax into the strainer at first; a flannel bag does as well for want of the hair bag mentioned in the receipt; then boil it, as you would a plumpudding, in a large pot of water. When it is all melted, lift it out, and put it into the press, which should be previously heated by pouring hot water upon it, or it will congeal the wax as it flows. The press should be set slanting, and have a spout leading from the lower side to the cold water into which the wax is to flow. The simplest kind of press I know is made of two stout boards planed smooth, the lower fixed on a slant, the upper one joined to it by stout hinges at the upper end, with a long lever coming from the lower end. When finished it will look like a gigantic pair of nutcrackers. Strips of wood should be nailed round the edges of the lower board, to prevent the wax flowing off sideways. When you put your bag with the honey in it into this press, you may put any degree of pressure upon it you please. If you think all the wax has not flowed from the bag at one pressure, return it again to the boiling pot, and try again. Now for a few words about melting your finer combs: Crush them with your hands into a saucepan with a little water at the bottom of it. Melt this slowly before the fire without boiling it. Take a fine sieve, or a piece of muslin; dip it into scalding water before you use it,

to strain the wax: for if it is cold, much will congeal upon it; then pour the fine wax through it into the moulds prepared as Sir John More directs.

A cup or basin is a mould for wax always ready at hand, and the bee wife may cast her cakes of wax to suit her own convenience, for household use. But when the produce of her bees exceeds her home consumption, she will find it convenient to run the wax into moulds containing each a pound, or some multiple of a pound, just as the dairy woman makes up her pound pats, and so on. When New Zealand exports wax, which will be when the produce of the woods is joined to that of the apiaries, it will be found most convenient to cast the wax into squares, like the chocolate cakes, which the Americans export to all parts of the world.

Hitherto I have spoken of honey and wax, the produce of the bees in their first and simple forms. The bleached wax of commerce is easily prepared by increasing the surface of the wax, and then exposing it to the action of sun and air. The method by which this is done in Poland, where bleached wax is made to a great extent, is to pour the melted fluid as cold as it will run through a hopper, with a slip in the bottom of it, upon a cylinder of metal turned true, which is kept cold by revolving in such a way that the lower part is always in water, just like a grindstone. By this means, the wax is spun out into long thin ribbands. These ribbands are then laid upon a frame covered with linen cloth, and exposed to the action of the sun, air, and dew. If the weather is fine, the colour will change in a few days.

Then melt again, and repeat the operation till the whole substance of the wax is perfectly white. Then cast them into cakes for use or sale.*

The uses of wax for domestic purposes, and in the arts, are various and extensive. The greater portion of that imported into England is used perhaps in candles. But I have already said that I hope the day may come when wax candles of our own make will take the place of dips. But there are many smaller articles which a careful housekeeper will like to have at hand; to say nothing of the pleasure of sewing with a well waxed thread. Lip salve and cerate are no bad things to have in the house: the latter is made by melting an ounce of wax, and heating an ounce of sweet oil, not boiling either. Pour them together at about the same temperature, and keep stirring steadily until they leave the fluid for the buttery state. If you leave off stirring just at the setting point, the wax and oil will separate, and you will have to melt again. But if you stir steadily all the time, you will have a substance soft as butter and smooth as oil, —of such excellent healing powers, that I have sometimes wished to have a sore place to test its virtues. The cerate may be made harder or softer by altering the proportion of oil to the wax.

The softer cerate is best for dressing a blister;

* A simpler way of bleaching wax in small quantities, is to run it into cakes in the usual way, and then bleach as before; only be careful not to overheat your wax, for you will spoil its colour, and deprive it of many of its useful qualities. Remember what I said of the gluepot fashion.

nothing better: the harder, for spreading on linen, to apply to any sore made by long confinement in bed. An excellent ointment for a burn is made by dissolving a lump of camphor in the oil before you add it to the wax. Remember what I said about stirring.

Many other things may be made of wax—lip salve, &c.; but I shall not stop now to give the receipts for them, as almost any old woman knows how to make them.

Now, to speak of the uses of honey: It will save you many a sugar bill if you have plenty of it; and many a bill for other things too. Excellent wine may be made from it, which, when it has been kept some few years, can hardly be told from sherry. The old receipts for metheglin I shall give in an appendix. Anybody who pleases may try it, or modify it so as to suit our altered tastes, by leaving out some of the yarbs. I fancy a few of us would like so many as suited queen Elizabeth's palate. The other receipts have been tried in New Zealand, and succeed well.

If your wine is a failure, remember that by sun and air it will turn into excellent vinegar.

First rate beer may be made from honey, according to the subjoined receipt. Without reckoning the worth of the honey, it is found to stand the maker at a penny a gallon. And what hard working man can have any excuse for sotting in a pothouse, when he can have a drink so strengthening and wholesome as this, if taken in moderation; with his wife, too, to share it with him after the labour of the day is over?

Honey cakes, such as Cerberus delighted in (he

had three mouths to fill, remember), may be made by any thrifty bee wife; and many other niceties which her own talent will lead her to try. I believe that clear run honey will do very well for preserving, though I have never yet seen it tried. No one can fear having too much honey, if it can be used for all these purposes. I have a great opinion of its virtues, though I do not sing them in quite so lofty a strain as good old Sir John More.

IX. Bees' Enemies.—There is no greater foe to bees than man. Alas that it should be so! What with mismanagement, what with neglect, what with mistaken kindness, the poor bee has a sorry time of it from him who ought to be her guardian and friend; and yet she knows full well how to repay her master's care, and, if I mistake not, becomes attached even to his person. Much of the ill treatment which the bee receives from her owner springs, doubtless, from ignorance; and this little manual may, I hope, go some way towards lessening the evil. Let my bee pupil but keep these maxims constantly in mind:—"That if he is to succeed with his bees, it must be by *following* nature, not by *thwarting* it."—"That one lesson which his bees teach him is worth a dozen which he can learn from this or any other bee books." You may, if you will but use your eyes and reason, and take advice from those who are able to give it to you, change sides, as it were, and become a bee friend, instead of a bee enemy. But there are other foes of the poor bee who cannot be taught better manners, because they have no reason to work upon; they are their "natural enemies," as an Englishman once used to think himself of the French. And I will

now give you, who are on the bees' side, short and plain directions for destroying, or at least guarding against, these implacable foes.

I. The most deadly are the spiders. It is a piteous thing to see a bee, when it is returning from abroad heavily laden, rejoicing doubtless at the treasure which it is about to add to the common stock, caught in the deadly snare which the spider has spread for her. Vain are her struggles; they only serve to wind the fatal meshes more closely round her, and unless speedily extricated by a friendly hand, she perishes miserably: I say, speedily; for even if you release the captive, unless it be done almost immediately, you will find it impossible to free her from the fetters in which she is bound; and although you return her to the mouth of her own hive, which she will try to enter, she will be turned out by her own mates as a sick and disabled cripple. Prevention, therefore, is better than cure. Brush away the cobwebs every time you visit your bee house (and I assume that you are a constant visitant). Only a sluttish housewife allows a cobweb inside her house, and only a careless bee master will suffer a cobweb to remain about his hives. In the first position, they are only a sign of untidiness; in the latter, his children get hung up:—for such he ought to consider his bees.

II. The mouse is a deadly enemy to the bee; but not so much in this as in colder climates. When the bees are in a state of torpor during several months of the year, then the mouse makes his insidious attacks, crawling through the doorway, if it be a large one, or even gnawing a passage through the straw; and when once within a hive, he commits

fatal ravages, eating up combs, bees, and all. Even in this milder climate the mouse nuisance must be guarded against. I have lost two hives by mice in New Zealand. The way to fortify your stocks against their attacks is to put little wedges into the doorway of your hives during the winter, when your bees are comparatively weak, though they have not such a total intermission of labour in this as in our northern land. The wedge must be so arranged as to leave free passage for one or two bees at a time, and yet they must be close enough to prevent a mouse from creeping in. As the warm weather comes on, take out one or two of the wedges, so that the doorway may be always proportionate to the bees which pass through it.

III. The bee moth, or rather the grub which springs from the eggs which it lays, is a contemptible little creature to look at, but does great damage when it gets firmly established in an apiary. You may often find it lurking between the edge of the hive and the bottom board, which seems to be a favourite place with the parent moth to lay her eggs in. The produce thereof is a little white grub, about half an inch long, all soft and defenceless, except his head, which is covered with a hard case of armour; and you may be pretty sure that this is the only part of his person which he pops out of his burrow, or else the bees would make short work of him.

In America, I find from a bee book which an unseen bee friend sent me from that place, this moth has committed fearful ravages (for I suppose it is that which they call the miller), and has destroyed the apiaries of whole districts. In this country it has

not made so much head. But still the prudent bee master had better beware of it in time. Prevention is here again better than cure. About twice a year, in spring and autumn, shift the bottom boards of all your hives; clean them well by scraping them, or even planing them, and if there are any signs of this grub, pour scalding water upon them. The place where they chiefly harbour is between the hive and its bottom board, so the closer they fit one to the other the better. I have seen these little hard-headed creatures tunnelling even in the solid wood of the bottom boards. Also clean the edge of the hive before you put it down again, remembering what I said about turning the combs up in their own planes, and that a few puffs of smoke, blown into the hive before you move it, will take away from the bees all inclination to sting. When a hive is weak, and the children of the wax moth numerous, they no longer content themselves with lying hid between the hive and its bottom board, but push their ravages amongst the empty combs, burrowing in them, and spinning their nasty webs, which the bees have great difficulty in getting rid of. So you must come to their aid. They themselves show you how to act; for a strong swarm gnaws away and carries out piecemeal every bit of comb which contains any of these grubs. A weak hive seems to give it up in despair. So, to use the words of De Gelieu, "the only means of saving the colony is to imitate the surgeon, who cuts off a diseased limb to save the rest. Every bit of infected comb must be cut out, leaving only those occupied by the bees."

This may be easily done by means of the comb

knife, which I have figured and described in a former letter. The odd shaped holes which are often found in the middle of combs in an old hive, are made, I doubt not, by the bees having cut out an infected part. A curious point here arises connected more with natural history, and the distribution of living creatures over the surface of this globe of ours, than with the management of bees; and yet I will not pass it altogether by. It is this: Supposing this wax grub is the same as that which is the pest of European and American apiaries, how did it come to these far away isles? Were the eggs or grubs brought in the first hive which arrived here from New South Wales? At all events this question, unsolved as I am content to leave it, leads to these practical results:—

1st, That it is of great importance thoroughly to cleanse old hives into which new swarms are put, by scraping and scalding them; and, 2dly, That where bees are sent to a distant station, be very careful to send them in clean hives or boxes, in which it is next to an impossibility that any grub or egg of the bee moth can harbour; and then it will be curious to see how long the bees remain free from the persecution of their "*natural enemies*."

IV. All these enemies to the poor bee are common both to England and New Zealand. With them the bees, and the bee master as their ally, have to fight in both lands. But there is another foe peculiar to New Zealand of a very nasty nature: I mean that stinking beetle, whose real name is *kekereru*, but which has been transmogrified by pakehas into cockeredoo. When a hive dwindles away to nothing,

and the bee master turns up his hive to see what is the cause and extent of the damage, he will often find a number of these black rascals in possession of the empty combs. I do not think they ever have the impudence to push their way into a fully occupied hive; but when a swarm becomes weak, they creep in by stealth. A stock which has lost heart from the death of its queen, and its inability to replace her, will not make any vigorous efforts to expel these intruders, though they continue for a time to work a little in very fine weather. When at last they come to nothing, and the bee master turns up his deserted hive, to see what has been the cause of his loss, he finds these kekererus skulking away between the empty combs, and thinks, naturally enough, that they are to blame, whilst they are rather the *result* than the *cause* of the ruin. A strong stock is well able to defend itself against these intruders. Just drop one of them, or a spider, into an observatory hive, and you will see them turn him out quickly enough, "hand over hand," as I have heard a sailor say. But yet it is well to keep your apiary as free as possible from these crawling stinkpots. Put your foot upon one whenever you meet him, and have as little shelter for them about your bee house as may be. For this reason, I like to have my hives, even though they be of straw, standing under one roof common to them all, rather than each protected by its own hackle. Nothing indeed is more sightly about a cottage than a row of these conical roofs; only mind, if your hives are protected in this way, to lift up the hackles every now and then, to see if these bee enemies are har-

bouring there. If you find them, take the law into your own hands.

Fowls should be kept away from an apiary; they are very destructive; and when they once get a taste of the bees, will stand near the mouth of the hive, and snap them up as they come out. Here the remedy is self-evident: keep your bees and your fowls apart.

The large species of dragon flies catch a great many; and many a queen, I fancy, falls a victim to these birds of prey. The queen is heavier of flight than a common bee, and thus is more easily captured. I have seen the large dragon fly "hawking" the bees, just as a kite does the small birds, and bearing them away in her sharp mandibles. Knock these robbers down whenever you can. They are not very numerous.

There are many of the New Zealand birds which, I doubt not, seize the bees in their flight. The kurimako I have taken in the fact; and I strongly suspect the tui, and other honey eating birds. They find it less trouble, I suppose, to gobble up the bee, with its burden of honey inside, rather than gather the honey, like honest birds, from a number of flowers for their own consumption. Whatever kind of bird you catch in this act of piracy, show no mercy, but shoot a number, and hang them up as scarecrows. I shall be curious to know whether New Zealand birds have made a sufficient advance in colonization to take this warning.

But all these enemies of the bees are nothing when compared with the bees themselves. The enemies I have spoken of attack and kill the bees single handed, whilst a piratical hive sends out its

squadrons to overpower and rob the hive which it has fixed on as the object of its attack. None but the weak hives are robbed. I mean, weak in bees; for a two year old stock, which is for some cause or other dwindling away, has often a large store of honey. So, unite the bees of a hive which is in this condition to its neighbour; or, still better, to some friend's bees at a distance, as explained in its proper place. A young bee master may not know at first when the robbers are at work. He will see as much bustle at the door of the hive which is being pillaged, as at any of his most prosperous stocks. Crowds of bees are rushing in and out, and all seems well. But look a little closer, and you will find that the bees are running *into* the hive with their honey bags empty, and returning with them full. How do I know, you may ask, whether a bee is laden or not? They do not, it is true, carry their load of honey so as to be seen; but when a bee has its honey bag quite full, the rings of her abdomen are all distended, and the end of it even drags along the ground; whilst a *light* bee carries her tail like a pointer's, straight out. Watch at the door of your hive on a fine working day, and you will soon see the difference. Every minute takes something away from the store of the hive, instead of adding to it. Lift up the hive gently, after blowing a few whiffs of smoke into the doorway, and you will most likely find the bottom board of the hive covered with dead bees, who have fallen in a vain attempt to defend themselves against the robbers. They have died fighting bravely in defence of their homes and treasures. The time for prevention is now past. The only thing to do is to

use the smoker: drive away the robbers from the combs, and secure all that is left to yourself.

If you are aware of an attempt to plunder at an early stage of the proceedings, stop up the hive which is attacked at once, by putting little wedges in the doorway, so that a passage may be left for the air, but not for the robbers. If the attempt is made in the middle of the day, when a number of bees are out at work, those who return home laden will of course be a good deal surprised to find the door of their own hive closed against them. But there is no cure for it; they must wait patiently till even, for then you may open the door.

The most certain remedy against robbers is to remove the hive which is attacked a mile or two off. Set it in some sheltered place, and leave it there till all danger of further attack is over. But if your apiary is fully stocked, and you have no particular reason for wishing to save this hive, the shortest and best way is to unite the bees, and take the honey and wax for yourself. So much for bees' enemies, and the means of guarding against them.

X. Miscellaneous Remarks.—The Bee's Sting. A good deal of the craft of bee keeping is different in New Zealand from that which is useful in England. The length of the summer, the mildness of the winter, and greater consequent increase of the bees—all these make the odds; and so I have compiled this little manual, which I believe will give you more practical hints than any European bee book would do, not excepting my own. If any other manual could give you the needful information, this never

would have been written. But a bee sting is the same all over the world: the pain is sharp for a minute or two; and it is not pleasant to have an eye entirely closed, or a nose twice as large as nature intended it. As the sting of the bee is the same here as it was in England, I can have nothing new to say on the subject; and will only quote what I wrote some years ago. I do not think, however, that the bees are near so irascible here as they are in England; and I account for it in this way: They have not so many enemies to contend with; the absence of wasps, in particular, enables them to preserve a more equal temper. I wish all Englishmen were as much improved in this respect as their bees are. Remember that a man's sting is not so easily cured as a bee's. So, if you are ever inclined to use your own in the shape of a sharp or angry word, substitute for it the honey of kindness, and then you will gain a lesson from your bees worth learning. But now for my quotation:—

"Many people who would otherwise keep bees are afraid of their stings, and so will have nothing to say to them. There are some people, it is true, to whom a sting is really dangerous: let them have nothing to do with them unless they love their bees so much as rather to brave all consequences than to give up keeping them. There are some people who, if they get a sting in their finger, straightway swell up to the shoulder, or even further; this is certainly not pleasant, though I do not believe any great harm comes of it. The worst place in which you can be stung is the inside of the throat: I have heard of a man

dying of swallowing a wasp, which was inside a peach which he bit in half: it stung him in the throat, which, as he did not know what to do to cure himself, closed up the passage of the breath, and so stifled him. If he had been an unhappy bee murderer, he would then find how unpleasant it is to be stifled. He ought to have run straight off to a doctor, who would, I believe, have put a small pipe down his throat, to keep the passage for the wind open. I myself was once blowing into a glass, to drive the bees out—(N.B. This was in my days of ignorance: I know better now),—when, in drawing my breath in sharply, I swallowed a bee. I prepared myself for a run to the doctor's, had I felt its sting in my throat, or lower down in my "inside pocket;" but the bee passed so rapidly down that he had not time to sting; when he got to his journey's end, no doubt not a little surprised at the path he had travelled, he resigned himself to his fate, like a good bee, and did not revenge himself by stinging me. Many remedies have been given for a sting; above all, pull the sting completely out, as it is barbed like a fish-hook, and will work into the flesh; then squeeze the poison out with the pipe of a small key, as you would a thorn, and put a little honey on the place, just to keep the air away: if this is done at first, the swelling will generally be a mere nothing. The pain only lasts two minutes; at worst, it is only a swelled eye for a day or two.

Another very common nostrum for rubbing on the place, after the poison is squeezed out with a key, is the washerwoman's blue bag. It is well to keep a

lump of indigo in your bee house. Other people recommend the application of a drop of sweet oil, laudanum, or eau-de-luce; you may try each and all of these, till you find the one best suited to your temperament. The strangest cure of all is that recommended by an old bee book, printed in the year 1792, by Robert Sydserf, who says, "If I am stung in the face, I generally swell almost blind. If on the back of the hand, the swelling ascends to the tops of my fingers; but if I am stung by two bees near the same place, the swelling is not so much; *and if I am stung by ten or more bees, the swelling is very little, or none at all. I would not of choice be stung by them, if it can be avoided; but after I have been stung once, I have no objection against being stung twice; and after I have been stung twice or three times, I do not mind if I am stung fifty or a hundred times.*" He then gives several instances in which this strange mode of cure was effectual in his own person, which, if true, would be a curious addition to a list of homœopathic remedies; and adds as the result:—"From these circumstances, I came to the conclusion *never to be stung by one bee alone, unless another is not to be had.*" He speaks not a little contemptuously of one of his bee apprentices, because "sooner than take my advice, and make use of my infallible speedy remedy, he will be content to be swollen almost blind, and go blinking like an owl for near a week together." But, after all, prevention is better than cure. Listen to the words of an old writer, who lived two hundred years ago:—"If thou wilt have the favour of thy bees that they sting thee not, thou

must avoid some things which offend them; thou must not be unchaste and uncleanly; for impurity and sluttiness (themselves being most chaste and neat) they utterly abhor: thou must not come among them smelling of sweat, or having a stinking breath, caused either through eating of leeks, onions, garlick, and the like, or by any other means, the noisomeness whereof is corrected with a cup of beer: thou must not be given to surfeiting or drunkenness; thou must not come puffing and blowing unto them, neither hastily stir among them, nor resolutely defend thyself when they seem to threaten thee: but softly moving thy hand before thy face, gently put them by; and, lastly, thou must be no stranger unto them. In a word, thou must be chaste, cleanly, sweet, sober, quiet, and familiar: so will they love thee, and know thee from all other." Above all, never blow on them; they will try to sting directly, if you do. If they come all about you, making the noise which you will soon learn to know as a sign of anger, go quietly away, and put your head into a thick shrub, if any is near. This will brush them off. If you want to catch any of the bees, make a bold sweep at them with your hand, as though there was no such thing as a sting in the world; the bee will be so astonished that she will not sting at first. Then hold her in your closed hand, without pressing her, and she will not sting. I have so caught three or four at a time. If you want to do anything to a single bee, catch her, "as if you loved her," between your finger and thumb, where the tail joins on to the body: she thus cannot sting you.

By handling a bee dexterously you may make her push out her sting, down which a drop of poison will be seen to trickle; you may cause her to deposit this drop on the back of your thumb nail, and if you are so disposed, may taste what it is like, as I have done many a time. You will find it a very sour and bitter acid, unlike any other taste I know, and by no means agreeable; so that you will be sure to spit it out again. Even if you were to swallow it, I do not think it would hurt you. Though it produces so violent an effect when introduced into the system through a sting, it is quite harmless when taken internally. I believe it is a substance in itself called melittic acid by the chemists. Formic acid (that of ants) is nearly like it, and is equally harmless taken internally. I have read somewhere, though I cannot remember the book, that our soldiers in the Peninsula, when parched with thirst, relieved themselves by eating a number of ants which they fell in with. A curious sort of travelling lemon-aid machine is an ant: I do not fancy you will make the same use of your bees.

The poison of the bee, though very powerful in its operation on men, is still more so on bees. A bee stung by another seems immediately paralyzed, losing the entire use of her lower extremities, which she drags after her in a piteous way, and soon dies. I have seen one bee dragging by her sting another bee whom she had wounded; so that it is entirely untrue that one bee never stings another. People have argued *à priori* that it is so; because, say they, she would in that case lose her sting, and perish: but the

argument *à posteriori*, which is in this case the argument *in point*, proves that she does sometimes sting other bees, though very rarely; for a forcible ejectment is the usual method which she uses with intruders. If she stings a man, she loses her sting, and dies; for our skin is of a compact nature, like leather: but she has power to retract her weapon, although it be barbed, from the softer membranes of a sister bee. Drones, too, are sometimes put to death by a sting; though the usual method employed for killing these nonproducers is by biting them about the root of the wing, when they fall on the ground, and perish miserably. In England I have seen the wasps, who are vultures in relation to the bees, eating out the insides of drones who were crawling about the ground in front of the hive from which they had been forcibly expelled.

The queen has a sting, though it is more deeply seated in her body: I have often made her protrude it, though I believe she never uses it on a man, reserving this poisoned dagger for the rivals to her throne. This is alluded to in Gwillim's heraldry, who says—

"Louis XII. entered Geneva bearing a coat studded with a swarm of bees, or; a king in the middle, with this motto—

Rex non utitur aculeo;

to show that he pardoned the rebellion of the Genevese."

And we learn, in the same curious record, that "Pope Urban the III. had for his bearing azure, three bees, or; a Frenchman who regarded him as

more attached to his nation than to the Spaniards, wrote this line—

Gallis mella dabunt, Hispanis spicula figunt.

To which the Spaniard answered—

Spicula si figant emorientur apes.

The Pope was made to answer in an ingenious way, and in a manner perfectly consistent with his office of pastor to the church—

Cunctis mella dabunt, sed nullis spicula figunt,
Spicula rex etenim figere nescit apum.

APPENDIX.

APPENDIX.

THE SITUATION OF THE HIVES OUGHT NEVER TO BE CHANGED.

I HAVE seen people shift about their hives very inconsiderately; but change of place invariably weakens them, as the bees will return to their old residence, the environs of which are so familiar to them. A hive should remain as fixed to the spot as the ancient oaks, in the hollows of which they delight to establish themselves, where they have their young, their companions, their beloved queen, and all their treasures. When the young bees take wing for the first time, they do it with great precaution, turning round and round, and fluttering about the entrance, to examine the hive well before taking flight. They do the same in returning, so that they may be easily distinguished, conducting themselves nearly after the same manner as the workers of a newly hived swarm.

When they have made a few hundred excursions, they set off without examining the locality, and, returning in full flight, will know their own hive in the midst of a hundred others. But if you change its place you perplex them, much the same as you would be, if, during your absence, some one lifted your house, and placed it a mile off. The poor bees return loaded, and seeking in vain for their habitation, either fall down and perish with fatigue, or throw themselves into the neighbouring hives, when they are speedily put to death.

The following fact proves how much these precious insects are attached to place, and how far they retain the recollection of it.

During my residence at Lignières, where I passed twenty-seven years, I removed all my hives into the house towards the middle of November, to guard them from the drifted snow in which my apiary would sometimes be buried, and I replaced them again some fine day in March.

Having hives of wood and straw, of different sizes and shapes, I arranged them with more order and symmetry; and, with this view, I placed the first on the opposite side of the apiary to where it formerly stood.

Although it had been shut up nearly four months, the bees returned to the same place they had occupied the year before, which obliged me to return my hive with all speed, and led me to conclude that they should not be moved about, and that the bees will not be pliable to our fancies and caprices.

When hives are transported to a considerable distance, there is no fear that the bees will return. But this inconvenience would be sure to take place, and many of the working bees would perish, if they were removed only a few hundred paces from the spot they have been accustomed to. The hive may not perish, but it will be greatly weakened. In my opinion, if the situation is to be changed at all, they should be removed at least a mile and a half.

RECEIPTS.

MEATH OR HYDROMEL.

Meath or hydromel is of two sorts; the weaker, and the stronger meath, or metheglin.

If your mead be not strong enough by the refuse of your combs, then put so much of your coarse honey into it as will make it strong enough to bear an egg the breadth of a twopence above the top of the liquor, which is sufficient for ordinary mead; and afterwards, till night, ever and anon, stir it about the kive. If you would make a greater quantity, then you must add a greater measure of water and honey; namely, six gallons of water to one of honey. Some will boil this proportion of six to one, to four; but I think to five is very sufficient: the spices to this proportion are cinnamon, ginger, pepper, grains of paradise, cloves, of each two drams. The next morning, put to the liquor some of the scum of the honey; stir them together, and stoop the kive a little backwards; when it hath settled an hour or two, draw it off to be boiled; and when you see the sediment appear, stop, and let the rest run into some vessel by itself, which, when settled, strain into the boiler, and the dregs of all cast into your garden for the use of your bees.

When your liquor is set over a gentle fire, and a thick scum is gathered all over, and the bubbles by the sides begin to break the scum, having damped your fire to cease the boiling,

skim it clean, and then presently blow up your fire; and when you see the second scum ready, having again damped the fire, take off the scum as before; and then, having again stirred your fire, let it boil handsomely for the space of an hour, or thereabouts; but be sure you always keep scumming of it as there is occasion.

After all this is done, put in your spices according to the former receipt, and let it boil a quarter of an hour more at least. The end of boiling is to cleanse the mead, which once done, any farther boiling does but rather diminish than increase the goodness and strength of the mead.

As soon as it hath done boiling, take it from the fire and set it to cool; the next day, when it is settled, strain it through a hair sieve or linen bag into the kive, reserving still the dregs for the bees, and let it stand covered three or four days till it work, and let it work two days; then turn it into a barrel scalded with bay leaves, making the spice bag fast at the top. If you make no great quantity of mead, you may turn it the next day, and let it work in the barrel; your ordinary mead which turns sour will make excellent good vinegar.

Metheglin is the more generous and stronger sort of hydromel, for it beareth an egg to the breadth of a sixpence, and is usually made of finer honey with a less proportion of water, namely, four to one. To every barrel of sixteen gallons of skimmed liquor, add thyme one ounce; eglantine, sweet marjoram, rosemary, of each half an ounce; ginger, two ounces; cinnamon, one ounce; cloves and pepper, of each half an ounce; all gross beaten, the one half boiled loose in the liquor, and the other half put into a bag before in mead; so that after this manner being made, as ordinary mead will not keep above half a year, this, the longer it is kept, the stronger it is, and hath the more delicate flavour and taste.

This was a drink frequently used among the ancient Romans, who, I suppose, first taught the ordering of bees, and brought this wholesome liquor into our island. We find by history, it was the approved and common drink of our ancestors, even of our kings and queens, who, in former ages, preferred the liquors of *the* product of this island, before those imported from foreign countries; as did the famous and renowned Queen Elizabeth,

who every year had a vessel of metheglin made for her own drinking. A receipt of this queen's metheglin coming to my hands, I shall oblige the reader therewith, as follows:—

Take a bushel of sweet briar leaves, as much of thyme; half a bushel of rosemary leaves, and a peck of bay leaves; and having well washed them, boil them in a copper of fair water: let them boil the space of half an hour, or better, and then pour out all the water and herbs into a fat, and let it stand till it be but milk warm; then strain the water from the herbs, and take to every gallon of water one gallon of the finest honey, and beat it together for the space of an hour; then let it stand two days, stirring it well twice or thrice a day; then take the liquor and boil it again, and skim it as long as there remains any scum; when it is clear, put into a fat as before, and let it stand to cool. You must then have in readiness a kive of new ale or beer, which as soon as you have emptied suddenly, presently put in the metheglin, and let it stand three days a working, and then tun it up in barrels, tying at every tap hole, by a pack thread, a little bag of beaten cloves and mace, to the value of an ounce. It must stand half a year before it be drank.

ROYAL MEAD.

In six gallons of water put six quarts of honey, stirring it till the honey is thoroughly mixed; then set it over the fire, and when ready to boil, scum it very well; add one quarter of an ounce of mace, as much ginger, half an ounce of nutmeg, some sweet marjoram, thyme, and sweet briar, together a handful; boil it in the liquid; let it stand till cold; set it working with a little yeast in a barrel, putting the bung lightly on, and filling it up from time to time with some of the same liquid. When it has done working, bung it up tight, and leave it in the cask several months before bottling it off. When it has been bottled some time it will effervesce like the best English gooseberry wine, and will keep, I doubt not, for years. *Probatum est.*

N.B.—One quart is equal to 3½lbs. of strained honey.

SACK MEAD.

Put one gallon of water to four pounds of honey; boil it three quarters of an hour, and scum it well. For every gallon of the liquor add an ounce of hops; boil it half an hour, and

let it stand till next day. Put it into a cask, and to every thirteen gallons of liquor add a quart of brandy. Put the bung on lightly till the fermentation is over, then stop it very close. If you make a large cask, keep it a year before you bottle it.

BOTTLED BEER, LIKE SCOTCH TWOPENNY.

To fourteen gallons of water add a pound of hops previously steeped in a little water; boil it half an hour; strain it and let it run upon the honey, about a pound and three quarters to each gallon of liquor, more or less. When cool, put it in a barrel, and ferment as before. This is an excellent summer drink; as is the following:—

GINGER WINE.

To eight quarts of water put eight ounces of ginger, twenty-four pounds of honey, and eight lemons. Work and bottle as before.

In the two last receipts the strength of the wort may be increased or diminished by varying the proportion of honey.

HONEY VINEGAR.

Put a pound of honey to a quart of water, mix well, and then expose in the greatest heat of the sun, without wholly closing the bung hole, which must be covered with coarse linen to keep out insects. In about six weeks it will be changed to vinegar of an excellent quality. A spoonful or two of this vinegar mixed with cold water is a very agreeable summer drink. It may be either used plain or made to effervesce by a little soda.

A cunning housewife doubtless would improve on many of these receipts; her main difficulty in supplying a family with these beverages will be in straining the honey, which runs very slowly when of a thick quality. This I think may be obviated by boiling clean honey combs in a due proportion of water, and then letting the liquor stand till cold, when the wax will have formed on the top, and may be taken off. Then proceed as above.

A less agreeable, though not less useful, application of honey, is in the form of a cough mixture.

Fill a quart bottle three parts full of clarified honey, mix well with this a teaspoonful of Ipecacuanha, then fill up with

sharp vinegar: a spoonful or two of this, whenever the cough is troublesome, will have a very good effect.

HIVES.

1. The set of bee boxes, consisting of three boxes fourteen inches square, and four and a half inches deep, glazed and painted, with bottom board, top, and cover for the glass, should be well made by any respectable carpenter for 15s. Any person who has difficulty in getting them made may do so, to any extent, by sending a letter with a remittance, to Mr. Hunter, carpenter, care of the Bee-master, St. John's College. Any one who is going to have a number made by his own carpenter would do well to get one as a pattern, and then follow it exactly. The advantage of these wooden boxes is, that if kept well painted, and protected from the sun, they will, with care, last almost for ever.

2. The common straw hive may be well made for 1s. 6d. They should be so strong that a man may stand on the top without bending them in. A very good mode of making the hole in the top, is to work a turned wooden collar into it, with a one and a half inch hole. This, when not in use, may be stopped quite tight with a large cork, or wooden plug:—mind that your straw hives are not made smaller at the mouth than in the middle, as it is then very difficult to get the combs out; and don't use cross sticks. I can't repeat this too often.

3. The observatory hive is ingeniously made, so as to fix two plates of glass exactly one and a half inches apart, which gives the bees room to build one comb, and only one, averaging an inch thick, and leaves a quarter of an inch for the bees to pass on either side between the comb and the glass. A cylindrical collar, on which the hive works, and through which the bees travel up into the hive, enables you to turn towards you whatever side of the comb you wish to observe, without disturbing the bees at their work. It is a very nice piece of furniture to have inside a room: it may be fixed in a window, the lighting board projecting through the window glass, and the piece of glass under which the bees travel coming so close up to the glass of the window, that not a single bee can get into the room. I shall not attempt, in this short Appendix, to give

a full description of this hive: it would be scarcely intelligible without some figures. The greatest improvement which has been lately made in them consists in letting the panes of glass into a groove, without any framing to the glass, so that every bee is at all times visible. This hive may be made for £1:10s. complete. I have made a modification of this hive, by setting the plates of glass so far apart, that the bees have just room to build two combs. Others are made in the shape of a cross, two such planes crossing each other. This hive is more expensive, costing £3. The Sicilian hive is a very handy form of the straw hive: when complete, it is like a long barrel resting on tressels, divided into three or more sections, which are all kept in their places, by fitting each of them into an extra rim of straw, worked round the edge of that which stands immediately behind it. The front, which is a flat disc of straw, is fitted into the last section in the same way. The advantage of this hive is, that it can be enlarged to any size, by adding fresh rings of straw. The honey, too, is very easily taken; a few puffs of smoke at the doorway will drive the bees into the far part of the hive, and then you may either cut out such honey combs, or take away a whole section. The *ruche a l'air libre*, or open hive, is nothing more than a square board fourteen inches and upwards, standing on four legs (like a table, in fact), with shutters fitting into rabbits cut in these legs. These shutters are to protect the bees in windy or rainy weather, but may be taken down when it is fine and still; and then you will have a beautiful sight: the whole of the bees, as they hang in their clusters, will be exposed to view; and combs, as they are filled, may be cut out with the greatest ease. It is a beautiful sight when fully stocked, and when there are two or three tiers of these table shaped frames on the top of each other: take care that your breath does not fall upon the bees as you are taking down the shutters, or you will be stung. A timid apiarian may modify these hives by having a plate of glass on each side, with the shutters over them. Rich glasses worked on the top of these hives look exceedingly well. All the sorts of hives here described may be seen at the apiary of St. John's College, where any fellow bee master will meet with a hearty buzzing welcome.

I have told you that you cannot learn so much from any bee book as from your bees themselves. Each bee master must observe for himself, and not trust solely to the observations of others; and what he sees he must record, as much for his own benefit as that of his friends. Eyes are common to all men: the great odds are in the way different men use them; or rather, in the way they make use of what they see. One man observes a thing, and straightway forgets it, or lets the facts which he has seen tumble up and down in his brain, like a number of small parcels, all without directions, thrown promiscuously into an ill arranged store: the owner has a very poor chance of ever finding again any parcel he wants; at all events, he opens a great many wrong ones, and has the trouble of tying them up again, to say nothing of the time he looses in the search, even if he succeeds at last: whilst the accurate observer sorts, arranges, ties up, and labels, every fact that he sees; throws away the rubbish, and puts that which is worth preserving into one of the cupboards or pigeon holds into which his brain is divided. Besides this, he keeps an index of the contents of his brain, such as the accompanying bee register which I have printed for your use: so, mind you fill it up accurately, and in a few years you will have a large store of observations. Each hive should be numbered, and the weight of the box painted outside, before you put the bees into it: give each swarm a page in your register: put down, in the proper column, the weight of honey you take from each; the swarms which you get; the boxes you put each into; and then, at any time, you can tell how large a family you have had from each hive.

BEE REGISTER.

BEGUN _____

ENDED _____

No. I.	THE QUEEN.		NAME OF HIVE.		
	SWARMS.		HONEY TAKEN.		GENERAL REMARKS.
	1847.			lbs.	
	October 1	Into No. 2	December 1	15	A glass; had some little poor comb in it; a top box.
	October 4	Went back	1848.		
			February 20	20	
	October 10	Into No. 3			
	December 1	Gone to the Hive.	May 1	15	
	January 15	.. .. ..	.. .. ..		I returned this swarm to the parent hive, having captured the Queen on the alighting board, as she was going out with the swarm.

REMARKS.
Found the Queen fallen at the front of the hive; put her into the observatory hive; she was immediately made close prisoner.